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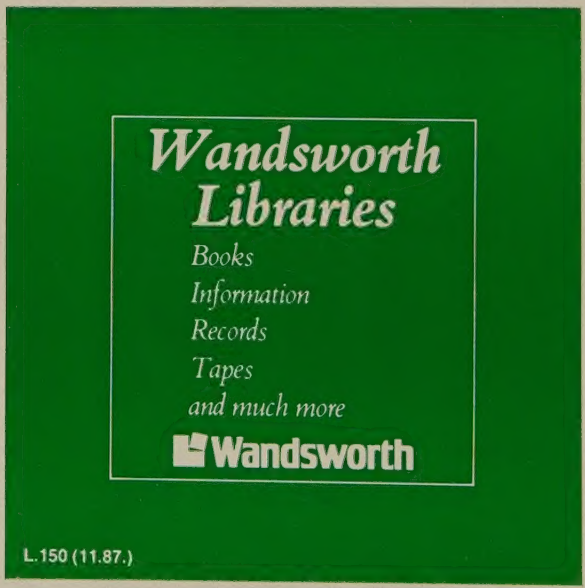

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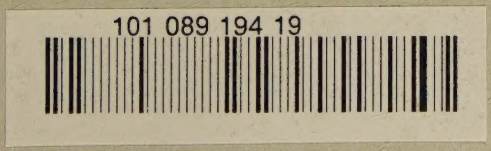
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FROM A PORTRAIT BY VAL PRINSEP ESQ. R.A. IN THE ROYAL ENGINEERS MESS AT CHATHAM.

HISTORY

OF THE

CORPS OF ROYAL ENGINEERS

BY

WHITWORTH PORTER

MAJOR-GENERAL ROYAL ENGINEERS

VOLUME II

LONDON

LONGMANS, GREEN, AND CO.

AND NEW YORK: 15 EAST 16th STREET

1889

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The Abyssinian Expedition of 1868 was essentially an Engineer's war. Its object was simply the recovery, from the hands of King Theodore, of sundry persons whom he had imprisoned, and whom we were bound to rescue. No great difficulties were anticipated in doing this, so far as the mere fighting was concerned. The Abyssinian soldiers were of the most inferior character, and could not be expected to stand against any force we might oppose to them. The whole difficulty was to reach the spot, and this was one of considerable magnitude. The formation of a road, by which the troops might travel, and the stores necessary for their maintenance be brought up, constituted the chief problem of the campaign. Very wisely, therefore, the supreme command of the expedition was vested in an Engineer. Sir Robert Napier had already shown, in his various services in India and China, that he was a man thoroughly capable of carrying through, to a successful termination, a task which was everywhere felt to be one that

would tax his skill to the uttermost. Foreign nations looked on with the keenest curiosity, to see how we were to reach our enemy; and it was by most of them anticipated that we were plunging into an operation that might lead us easily into serious disaster. Thanks to Sir R. Napier, these forecasts were doomed to disappointment. Every step in the campaign was carefully thought out and provided for. With as little delay as was possible, in the face of the very great natural obstacles to be overcome, the troops were landed on the plateau of Magdala, and after one brief struggle the war was over, the prisoners rescued, and the army re-embarked.

The Engineer operations of this short and most successful campaign are in reality the campaign itself, and they consist only of a number of details, most necessary indeed, and wonderfully well performed, but not lending themselves much to the interest usually attaching to the description of a war.

The first step taken was the despatch of a reconnoitring party from Bombay, consisting of five officers, one of whom was Lieutenant-Colonel St. Clair Wilkins, R.E., to select the best point on the coast to form the base. This, after careful inspection of all the possible places, was decided to be at the village of Zoolla, in Annesley Bay. Here the water supply of the river Haddass promised very fairly, and although the shelving nature of the beach rendered much labour necessary in the formation of piers, no better site could be discovered. The first step to be undertaken was the construction of these piers, and from the nature of the beach they had to be of considerable length. No stone was available in the vicinity, the plain being covered with brushwood. Fascines were, therefore, made use of for the first pier, to form retaining walls as a temporary measure, whilst native boats were engaged to bring stones from the opposite side of the bay. These, when procured, were built into walls outside the fascines, thus giving a character of greater permanency to the piers, which were run out for a distance of 900 feet into the sea, and even then only gave a depth of 5 feet at low water. A second pier, of similar dimensions, was afterwards constructed on piles, the materials for which were brought from Bombay.

The troops forming the Expeditionary force arrived by degrees, the advanced brigade landing in November, 1867, and the Headquarters early in January. The Engineer staff consisted of Lieutenant-Colonel St. Clair Wilkins, C.R.E., with Captain C. Goodfellow as his Brigade-Major. There was one Company of Royal Engineers (the 10th), under the command of Major Pritchard, R.E. Of Indian Sappers, there were three Madras Companies, viz., G, H, and K, and four Bombay Companies,

viz., the 1st, 2nd, 3rd, and 4th. The Madras Sappers were under the command of Major H. N. D. Prendergast, and the Bombay Sappers under Captain Macdonell. Altogether, thirty officers of Royal Engineers were engaged in the Expedition; but their names will be more appropriately given in connection with the various works for which they were detailed, and which will be described seriatim.

1st. *Base at Zoolla.*—Two piers were constructed, as already mentioned; a tramway was laid down on the beach, extending to low water line; a camp was established about a mile from the sea, and a road cleared to it; twenty wells were sunk; Commissariat sheds erected; and a water shoot on trestles, 480 feet in length, constructed, to convey to the store tanks the water condensed by H.M.S. *Satellite*. The Royal Engineer officers engaged in this work were Captains Goodfellow, Chrystie, Wood, and Lieutenant Lee.

2nd. *Railway.*—This was laid down from the water's edge to within a mile of Koomaylee, where a camp was established at the foot of the hilly ground. This line was ten miles and a half in length, and rose in that distance to a height of 350 feet. Including sidings and loop line, over twelve miles of rail were laid. For the first six miles it rose pretty gradually on an even incline to a height of about 100 feet. It then passed through a low range of hills, keeping near the bank of one of the branches of the river Haddass. At this part there was some heavy work in cuttings, embankments and bridges. Eight iron girder bridges had to be constructed to cross the river at various points. The officers who superintended the formation and maintenance of the line were Captain Darrah, Lieutenants Willans, Pennefather, and Baird. The actual work was executed by men of the 23rd Punjab Pioneers and 2nd Bombay Grenadiers. Lieutenant-Colonel Wilkins reported thus of the difficulties under which the line was laid:—

"The difficulties of constructing a railway with unprofessional labour have been greatly enhanced from the circumstances of five different descriptions of rails having been provided for the work on four different principles of fixing. Had it been possible to land and carefully stack each description of rail prior to platelaying, the variation in the rails would not have been the cause of much inconvenience. As it happened, this difference of pattern proved most annoying; for the disembarkation of the plant just kept pace with the requirements of the works, and the line was fed from hand to mouth throughout. Consequently there was no time for sorting and stacking. The Kurrachee rail has given the greatest trouble in laying and maintenance, being very much worn and bent, and being a joint chair and not a fish-plated rail. The 40 lb. fish-

plated rail would have been more useful if the fish-plate holes had fitted those in the rails. In five cases out of ten they did not fit, nor would the bolts go through the holes."

It may be mentioned that before the Expedition started an eminent contractor was called on for a tender for the laying and maintenance of the line. This would have amounted to £72,000, being fixed at the rate of £6,000 a mile. The actual cost only reached £6,000.

3rd. *Roads.*—This was the most important part of the work. The first portion of it was from Zoolla to Senafe, a distance of 63 miles, rising in that length to a height of 7,400 feet. In this part there were several defiles, involving much engineering The road when completed had a breadth of ten feet. Huge boulders and other forms of granite presented obstacles which in most cases had to be surmounted by ramping over them; those which it was absolutely necessary to remove resisted the penetration of the miner's drill so obstinately that much time was expended before the Sappers could make any impression. In some parts the road had to be cut out in the mountain side. Beyond Senafe, for a further distance of 37 miles to Addigerat, a cart road of an inferior description was formed. Here also in places it had to be cut out in the mountain. Beyond Addigerat to Magdala the road was only a track passable for elephants and laden mules. The officers who undertook this portion of the work were Captains Hills, Short, and Lieutenants A. K. Jopp and Coaker.

4th. *Tube Wells and Pumps.*—The water supply for the troops and animals was throughout a very anxious question. Whilst the camp was fully occupied at Zoolla the demand was enormous, and about 200 tons were daily condensed by steamers in the harbour and landed at the shoot, from whence it was conveyed to tanks. When the camp moved forward to Koomaylee the demand at Zoolla fell off greatly, but naturally sprang up at the latter place. Wells had been sunk at all practicable spots on the way; these were of much assistance, and by means of force, suction, and chain pumps the supply was made ample for all wants. This continued to be the case at all the posts as far as Addigerat, but beyond that the difficulties vastly increased, and Lieutenant Le Mesurier, in whose charge this department was, reported on it as follows:—

"Beyond Addigerat no stores could be carried, and paved slopes were made into the Nullahs for the animals, Norton's tube wells supplying drinking water. Beyond Antolo four Norton's tubes and driving apparatus complete were carried on six mules as far as Lat; they were then of necessity left behind, and finally reached Magdala on the eve of our departure, enabling us, however, to obtain a supply of pure drinking water after a want of it for sixty hours. . . . . The water in the

small native wells in the immediate vicinity of Magdala was unfit for any purpose, owing to the number of dead animals, &c.; and the small supply obtained from the wells dug by the troops, though clear, was of a peculiarly bitter taste. A medical officer assured me that it was not injurious."

The maintenance of the water supply was under the charge of Lieutenant Le Mesurier, assisted by Lieutenants Clarke, Sargeant, and Mainwaring, all Royal Engineers.

5th. *Telegraphs.*—These were under the charge of Lieutenants St. John and Pusey, and were worked by a portion of the 10th Company Royal Engineers.

6th. *Flag Signallers.*—A party of 11 Non-commissioned Officers and Sappers, who had been carefully instructed in the principles of flag signalling at Chatham, were sent out under Lieutenant Morgan, Royal Engineers, and attached to the 10th Company. At the time of the Abyssinian expedition no regular system of flag signalling had been introduced into the army. It was therefore with much interest that the experiment was watched. Its complete success was one of the main causes of its general adoption. The following sample of work done by them is given in Head's "The Royal Engineer": —

"In the advance on Magdala, a few days before the attack, our army had to traverse a precipitous ravine, at the bottom of which was a river of great depth. A small armed party, accompanied by armed Royal Engineer signallers, were sent into the ravine, with orders to discover if possible a way out of it on the opposite side, which should be practicable for the passage of the army. After several hours of toilsome investigation and suspense, a sapper from a perch on the opposite side signalled to the army, '*passable for infantry*,' and very shortly, after further investigation had been made, his intelligent flag signalled '*passable for cavalry*.' Now, if the exploring party had not been accompanied by the R.E. signallers, the army, instead of at once proceeding, would have had to await the safe arrival of a messenger, who, on attempting to return with his information, might have been shot, and who at any rate would have had several hours' toil to scale the sides of the ravine, to communicate his intelligence, thereby retarding it perhaps a day in its advance on Magdala. The value of a day under such circumstances, when the army were on short provisions, would have been almost incalculable to any one except Sir Robert Napier."

Head gives some further examples of the messages transmitted by flags, and one of them refers to the question of short provisions. It was from Sir Charles Staveley to Quartermaster-General, "Is the ration to be reduced all round, including those who do not eat meat?"

7th. *Photographers.*—These had also been attached to the 10th

Company. They photographed all important and interesting scenes on the road up, under the special superintendence of Major Pritchard.

8th.—The *Engineer Park* was in charge of Captain Greig and Lieutenant Sexton.

Such were the arrangements under which the advance was made, the actual command of the Engineer force which reached Magdala being in the hands of Major Pritchard, R.E. This consisted of the 10th Company Royal Engineers, K Company of Madras Sappers, and 2nd, 3rd, and 4th Companies of Bombay Sappers. Captain Goodfellow, the senior Royal Engineer, was present, acting as Commanding Royal Engineer on the staff of Sir R. Napier. Lieutenant-Colonel Wilkins, the Commanding Royal Engineer of the army, was, by Sir R. Napier's orders, posted at the base, as being the most important position to ensure the safety of the troops.

On April 10th the troops reached the vicinity of Magdala, and were able to judge of the precise character of the work before them. It was found that the place was situated on the farthest of three spurs forming together one crescent-shaped mountain, the central one, called Selassee, being the highest. Between Selassee and Magdala, there was a plateau on a lower level called Islamgee. The third spur on the near side of Selassee was called Fahla. The difference of level between Selassee and Magdala was 150 feet, whilst the plateau of Islamgee was 500 feet below the highest point of the former. The configuration of the hills was most peculiar; they were surrounded by horizontal bands of scarped rock, some as much as 100 feet, and others only ten feet in height. These formed serious obstacles, and rendered access to the summits most difficult. The only road, if such it could be called, dignified by the name of the King's Road, swept along the lower ground on the left of Fahla, and then passed on the right of Selassee till it debouched on the plateau of Islamgee, and climbed into Magdala.

Magdala, although not on so high a level as Selassee, was more inaccessible. It was guarded by two natural scarps, the first or lower one being over 250 feet in height, and the upper one varying in parts from 20 to 70 feet. It was entered through gates on two sides, that on the Islamgee side being the Kokilbir gate. It was here that a passage was to be forced. This entrance in point of fact consisted of two gates, the first being in a small outwork about 70 feet below the main gate. The path between them was not wide enough to permit two men marching along it abreast. The lower entrance was through a small double-storied hut about ten feet square, built of stone and mud. The doorway was four feet wide, made of stout timber. A stockade stretched

on either side of this entrance from the scarp on the east to that on the west, effectually closing the only portion of the hill that was otherwise accessible. It consisted of a dry stone wall, into which were inserted horizontally branches of trees. Similar stockades were made at the upper gate, as well as at the one on the far side of the place. Although these defences were powerless against even field artillery, they would have proved very formidable to an enemy armed only with spears, or even muskets. It was doubtless against such that they had been designed.

As soon as the force had reached the plateau of Affigi, the Abyssinians who had been encamped on Islamgee, with their guns posted on the summits of Fahla and Selassee, swarmed down the King's Road and delivered their attack in two bodies. One of these came into contact with the 4th King's Own Regiment, which was supported by the fire of the rockets of the Naval Brigade, the other was met by the 23rd Punjab Pioneers and a battery of mountain guns. The result was not for one moment doubtful. After suffering severely from the cross fire to which they were subjected, and not having been able to inflict any serious injury on their opponents, they turned and fled. The troops then encamped leisurely, and made their preparations for their final advance. The next two days were occupied in futile negotiations on the part of the King. He was willing to yield up his prisoners, and in fact did so while the parleying was proceeding; but he steadily refused Sir R. Napier's ultimatum of an unconditional surrender, saying that "a warrior who has dandled strong men in his arms like infants will never suffer himself to be dandled in the arms of others."

Finding it impossible to carry his point peaceably, Napier ordered an advance on the morning of April 13th. This was carried out skilfully and cautiously, the nature of the ground over which the troops had to march being such that, had any serious resistance been offered, the difficulties would have been enormous. The first contact with civilized forces had, however, proved sufficient for the Abyssinians, and no opposition was encountered. By the middle of the day two mountain batteries had been brought on to the plateau of Islamgee, and the 12-pounder Armstrong battery on the neck between Fahla and Selassee. A fire was at once opened on the Kokilbir gate for about half-an-hour, and then the assault was ordered. Major Pritchard thus describes the Engineer share in the business:—

"About 2 p.m., when it was decided that Magdala should be taken by assault, I received orders to send back for the ladders, powder barrels, bags, &c. (these by order of Sir C. Staveley had been left at the foot of the

cliff). I accordingly sent a detachment who brought up the ladders, the two barrels of powder and fuze, &c., but not the powder bags, which, on enquiry, I found had been taken by the natives for their original purpose of carrying water. I reported the circumstance to Sir C. Staveley and informed him that I could, if necessary, blow open the gate of Magdala with one of my barrels of powder and fuze. About 4 p.m. the Engineers took the post of honour, carrying our intrenching tools, ladders, two barrels of powder, fuze, &c., and led the way along a path on the side of a precipice to the gate, on the right of which, over the wall, we effected an entrance by climbing and using our ladders."

This is all Pritchard tells of the mode in which the entrance was effected. The details were as follows—On arriving close to the gate the enemy opened fire through loopholes, by which Major Pritchard, two Non-commissioned Officers and one Sapper were wounded, and Lieutenant Morgan at the same time received a severe contusion in the head and shoulder from stones. One of the loopholes being somewhat vigorously served from within, Pritchard directed Sapper Chamberlain to fire through it from outside. This with his breech-loading Snider, Chamberlain at once proceeded to do, and soon cleared it of its occupant. Lieutenant Morgan did the same at another with his revolver, and the fire was stopped. Then entrance was made at two points, Corporal M'Donough, R.E., being the first man in at one, whilst Major Pritchard, Lieutenant Le Mesurier and Sapper Bailey (one of the flag signallers) entered at the same moment by escalade at another. Immediately following them the 33rd Regiment forced their way over the stockade at the right, and joined Pritchard and his small party within the gateway. They then made a dash at the upper gate, which was not defended, the enemy flying in all directions. Here they found the body of King Theodore, who had destroyed himself on realizing that his troops could make no stand against the British forces. Before doing so he wrote a letter to Sir R. Napier, saying that it had always been his duty to rally his men when they wavered in battle, that he had killed and punished his soldiers for their flight after their first attack, but that he could not get them to face their enemy again, and that he attributed his defeat to the superior discipline of the soldiers brought against them.

So ended the war; the prisoners were rescued; on April 17th Magdala was burnt to the ground, and the fortifications, such as they were, destroyed. The army wended its way back as rapidly as possible and re-embarked on reaching the base. Unfortunately Lieutenant Morgan was not destined to accompany them. He had been ill from the moment of his arrival in the country, and the hardships and severe fatigue he underwent with his signalling party completely broke him down. He had rallied sufficiently to be able to

take part in the assault, but the excitement of that day, coupled with the contusions he received, were too much for his enfeebled constitution, and he died on April 26th, on his way back.

Sir R. Napier wrote thus on the event:—

"The Commander-in-Chief has received with great regret the report of the death of Lieutenant Morgan, R.E., in charge of the signals of the 10th Company R.E. Sir Robert Napier had constant opportunities of observing the unflagging zeal and energy of this young officer, and the cheerful alacrity with which he embraced every opportunity to render his special work useful to the force. Lieutenant Morgan set a bright example to those under his command, and by his premature loss—owing to prolonged exposure and fatigue—Her Majesty's service and the Corps of Royal Engineers are deprived of a most promising officer."

Thus closed the campaign, which has a peculiar interest for Engineers, in that it is the first in which the supreme command was entrusted to one of their corps. Until that moment it had been held as an axiom at the Horse Guards that an officer of the scientific branch of the service was for that very reason incompetent to fill such a post. It was left for Sir Robert Napier to prove the fallacy of the notion. The difficulties attending the operations were probably more considerable than would be encountered in most campaigns, but it was universally admitted that, great as those difficulties were, they were clearly foreseen and admirably provided for. Since that date, and probably owing largely to that experiment, the veto has been withdrawn. Officers of Artillery and Engineers have been employed in high positions in command of troops other than those of their own services, and the results have proved as satisfactory as in the case of the Abyssinian campaign. The peerage earned by Lord Napier of Magdala shows the value set by public opinion on his work, but he has received beyond this the warm gratitude of his brother officers for having demonstrated how fallacious was the idea that men of the scientific corps were wanting in the military genius necessary for the command of an army.

CHAPTER XXIII.

The Ashanti War, 1873-1874.

Difficulties of the Operation—Mode of Advance—Home's First Experiences—Description of the Mansue Station and of the Huts constructed for the Troops—List of Stations to the Prah—Different Forms of Bridges—Crossing Swamps—Sickness amongst the Engineers—Road Clearing—The Telegraph—The Steam Sapper—Advance to Amoaful—Collision with the Enemy—Captain Buckle killed—Advance on Coomassie—Lieutenant Bell's Gallantry—Destruction of Coomassie—Return of the Force—Difficulty with the Bridges—Embarkation for England.

The Ashanti campaign was in many respects not dissimilar to that undertaken a few years previously in Abyssinia. They were both Engineer wars in their main characteristics. In each the difficulty to be overcome was the introduction of a force into the interior of a country entirely unprovided with roads, and which did not afford any means of subsistence. In both the Engineers were called on to fight against obstacles of no common character, and in each it was evident that as soon as the troops could be brought into contact with the enemy the war would be over.

In the case of the Ashanti war the difficulties were greater in many respects than those which were so successfully overcome by Lord Napier and his Engineers. The road had to be cut through a dense jungle. It was therefore impossible that any adequate protection could be afforded to the advanced parties of Engineers engaged in the task. The only labour available was that of the natives, the Fanti tribe furnishing nearly all the workmen. These men, feeble and inferior as they were, and totally unaccustomed to the use of European tools, were at the same time most insubordinate and difficult to deal with. They had, moreover, been inspired with such a terror of Ashanti power that they were perpetually subject to panics, whole gangs of them vanishing on the least rumour of the approach of the dreaded enemy. Add to this that the climate was pestilential, the moist and steaming atmosphere of the days and the equally moist but chilly temperature of the nights soon striking down the hardiest with fever, and some notion may be obtained of the difficulties under which the operation was carried out.

The Engineer branch of the expedition was thus composed:—Major R. Home, C.R.E., Major R. O. Jones, Captain Buckle, Lieutenants Bell, Jekyll, Mann, Skinner, and Cotter. Of these Major Home accompanied Sir Garnet Wolseley, and landed with him on September 27th, 1873, Captain Buckle with Lieutenants Bell and Mann on October 10th, and Major Jones, Lieutenants Jekyll, Skinner, and Cotter with the 28th Company Royal Engineers on December 10th.

The object of the campaign was to reach Coomassie, the head-quarters of the Ashanti tribe and the residence of their king. Between Cape Coast Castle and this point (a distance of about 160 miles) there was a mere track, passable by natives, but utterly impracticable for troops. It became necessary, therefore, to cut a roadway through the jungle the entire distance. The principle adopted was to establish stations at the most convenient distances, to allow of troops passing from one to the other in a day. At these stations huts were erected, rough fortifications constructed, to enable them to be held by small parties against the attack of hostile natives, and the ground cleared for some distance around them. Bridges were thrown across the innumerable streams encountered, and in some instances, notably that of the River Prah, these structures were of considerable importance.

The first day's work was not a happy one. The station at Acrowful, a small village about fifteen miles from Cape Coast Castle, had been already made defensible, when, on October 13th, Major Home started with 175 native labourers, assisted by Captain Buckle and Lieutenant Mann. He thus records his experiences:—

"In this the first march made by the C.R.E. with native labourers, the greatest confusion prevailed. There was no order, men flung down their loads, and stopped when they chose, began to cook at all times, and, far from getting into Acrowful at twelve o'clock, the last of the men did not arrive till dark. This was by no means a hopeful beginning.

"October 14th. At 6 p.m., the C.R.E. determined on going on to Dunquah, about six miles, and sleeping there that night. The men refused to move in a body, they all determined not to go. Lieutenant Jones, commanding the detachment 2nd West India Regiment, marched a party to the spot, and after some of the ringleaders were flogged, the greater part ran over the bridge, and went in the direction of Dunquah, which the C.R.E. reached at 11 p.m.

It should be stated that Lieutenant Gordon, of the 90th Regiment, had been for some time in the country, and was performing the duty of an acting Engineer before the arrival of an expeditionary force. He had been engaged with a party of native police and volunteers in cutting a road from Acrowful backwards towards

Cape Coast Castle and forwards to Dunquah. When Major Home overtook him he was at work beyond the latter point towards Yancomassie Fantee, and the Commanding Royal Engineer thus reported of the work:—

"I have now seen the road from Cape Coast to Yancomassie Fantee. With the exception of $3\frac{1}{2}$ miles between Yamoranza and Assayboo, it is all fairly passable for infantry in fours. I think Gordon deserves great credit for what he has done."

In fact there is no doubt that Gordon had proved himself a most valuable man. He seemed to have an influence over the native workmen very difficult to obtain, and he showed great skill and tact in the selection of those he engaged. The consequence was, that whilst desertions were rife in all the other parties, those which had worked under Gordon proved steady and trustworthy. The next point to be secured was Mansue, about half way to the river Prah. This it had been decided should be the main station on that part of the road, which was to the south of the river. It had many advantages, amongst others a large open space only covered with Guinea grass easily cleared, a good and plentiful supply of water, and a quantity of bamboo. These were required for the construction of the huts, which are thus described by Major Home:—

"The huts were built seventy feet long, seven feet to the eaves, and seventeen feet wide. The method of making these huts is as follows:—A framework of bamboos was formed, uprights placed every five feet to carry the rafters, which were supported by centre bamboos or forked sticks. The whole of the plates, ridge pole, and rafters, were lashed together with creepers, and a solid framework thus formed; indeed, it was extraordinary how strong the framework of the hut so made became. While the hut was being framed, a number of bamboos cut to the proper length, *i.e.* the height of the eaves from the ground, were prepared. They were struck repeatedly at the knots with a sharp, hard hatchet, until the bamboo (almost all the bamboos were female bamboos) opened and unrolled, becoming, in fact, a bamboo plank. This was forced in between the plates of the wall. Each bamboo unrolled to about fourteen inches wide, and a succession of the fourteen-inch planks formed the walls of the hut. The roof was formed by getting the palm leaves, stripping them off the central stem, and tying them with creepers to a light framework; this was pulled up to the ridgepiece, and lashed to the eaves and the ridge, the whole being finished by filling in the space with dry plantain leaves, and a capping of thatch made on purpose. . . . . Guard beds were formed in each hut down the sides. These were of split bamboo, with the round sides up, supported on longitudinal bearers, which ran the whole length of the hut. These guard beds had some spring, and with a blanket were far from uncomfortable."

As the station at Mansue was more or less a type of the more important posts established on the road, some little description of it may be interesting. The clearance was about 500 yards in length, by an average width of 300 yards, the road running nearly through its centre. Commanding the latter was an enclosed work called Fort Cambridge, an irregular polygon of some 200 feet by about 120 feet, surrounded by a stockade of bamboo, beyond which was a small ditch some five feet deep, well fraised on the escarp. At one side was an anthill, which dominated over the rest of the fort. This was made into a keep, by forming a bamboo redoubt, the walls of which were sunk within the hill to such a level as to protect them from an enemy's fire, and yet to enable that of the defenders to sweep the interior of the fort. Besides this redoubt, the fort contained four large huts for stores and a guard room. Outside the fort the camp was laid out with eleven huts, echeloned on the north side for the European troops, with three smaller ones for the officers. On the south-west were the lines of the coloured troops, viz., the West India Regiment, the Cape Coast Rifles, and the Native Allies; and on the east were the lines of the Police, the Royal Engineer labourers, and the Volunteers. In the centre, close to the fort, were seven hospital huts. There was also a Royal Engineer Park with forge, a Control store yard and transport office, and a telegraph and post office.

The station at Mansue was larger and more complete than any of the others between Cape Coast Castle and Prahsue, on the River Prah, but they all, more or less, partook of the same character. They were as follows, starting from Cape Coast, viz., Inquabim, Acrowful, Yancomassie-Fantee, Mansue, Sutah, Yancomassie-Assin, Barraco, and Prahsue, on the river Prah.

The next important work to be performed was the bridging of the numerous streams that were encountered on the way. Fortunately for the Engineers there was an abundance of timber, in the form of trees of all dimensions, as well as strong bamboos, whilst the creepers gave an inexhaustible supply of rope. The bridges were of three kinds of construction, in accordance with their importance, the width to be spanned, and the depth of the stream. The simplest form, which was all that was required in the majority of cases, was that of trees felled and thrown across, supported in the centre by forked uprights wedged in the bed of the stream; the roadway made of rough timber lashed to the bearer trees by creepers, and every here and there spiked down. Where the width was greater, the ordinary form of single lever bridge was adopted, whereby three points of support were obtained. In the case of the Prah, where the span was sixty-

three yards, a totally different principle was necessary. On this subject Major Home reported as follows :—

"The bridge now became the great question. The Blanchards pontoons were the only means available for crossing, and were far too few to rely on for the vast number of carriers that had to pass to the front. . . . . Twelve trussed girders had been prepared at Chatham. These were very slight and strong, and would give a bridge across the river 2 ft. 6 in. wide ; but considering the very important link in the communication this bridge was, it was determined to make the bridge not less than 5 ft. wide. Thus the trussed girders would give one half of the roadway required, and the remainder, consequently, would have to be made up of material to be procured on the spot. . . . . Captain Buckle had made a section which showed that the river was not only deep, but that the bottom was fairly regular, and of hard sand. There were no means of driving piles, and such light trestles as the tackle on the spot would get out would undoubtedly be carried away in a short time, as the current was running nearly four miles an hour, and freshets were to be expected. Under these circumstances, crib-work piers were determined on."

These cribs were made 8 feet by 6 feet at bottom, tapering up to 4 feet square at the level of the water, and continued at that dimension up to the roadway. They were formed of logs of wood placed alternately lengthwise and breadthwise, the bottom being grated with logs to retain the sandbags with which, when in place, they were to be weighted. They were built on shore and floated into position, being buoyed up with barrels during the transit. When fixed they were filled with sand bags and other weighty substances.

"The day after the first crib was launched it was found to have sunk 17 inches into the mud, and to be only 4 inches out of level. This was easily made up by putting a couple of thick sticks on the low side. The crib was raised to its full height, and transoms of roughly adzed timber laid in."

The difficulty with all these bridges was the change of level in the streams. In the case of the Prah bridge the rise of the water way nearly rendered it impassable during the return of the expedition.

Next to the spanning of the streams the crossing of swamps was a difficulty which taxed the resources of the Engineers—

"The whole of the country between Faisowah and Sutah was the swamp or morass where the Okee took its rise, and to relieve this water-logged country would have required a system of artificial drainage far beyond the powers of the Engineers."

The road was formed by cutting a deep trench on either side,

brushwood fascines and small trees were laid on the roadway and covered with the clay that had been taken from the trenches. This rough construction answered its purpose fairly well, but it proved a somewhat inferior road, and left much to be desired. Some idea may be formed of the work that had to be done in the swamps from the following extract :—

"Every tree that was cut down was so intertwined with creepers that when cut it would not fall, but remained in its place supported by others until sometimes four or five trees had to be brought down. The mass of branches and foliage knotted together with creepers was thus very great, and as the trees fell the huge ants nests were broken, and the ants running all over the place actually drove the men from their work."

It may well be imagined that sickness would be rife under such circumstances. It is very sad to read the numerous entries in the Royal Engineers' Journal under this head.

"27th Nov.—Lieut. Bell, R.E., was seized with fever, and unfit for duty. The C.R.E. was similarly laid up, and Lieut. Hearle, R.M.L.I. with Serjeant Dickson, R.E., at this period did the work alone for some days.

"2nd December—There was at this time much sickness amongst the Engineer N.C.O.'s., eight out of the twelve being laid up with fever.

"At the beginning of the year Lieut. Skinner became so ill that the medical men declared that he must be sent back to Cape Coast. He was accordingly carried to the rear in a hammock, to the regret of everyone, as he had worked most zealously during his short stay in the country. At this time it became apparent that Lieut. Mann, who had done much good hard work, and had borne sickness and exposure in the hope of eventually getting to the front, would be unable to do so. Nothing but his great pluck had hitherto saved him, and at this time he was so seriously ill that he could not be moved to the rear.

"22nd Jan^{y}—Captain Buckle, R.E., Lieut. Hare, 22nd Regiment, both ill at this place" (Quisah), "and the detachment left at Moinsey marched in, reporting Lieut. Cotter ill with fever at that place."

Entries of this type appear from time to time throughout the whole report.

The following detail is given of the ordinary mode of proceeding in clearing the road :—

"A little before daybreak fires were lighted and each European had a dose of quinine, a mug of cocoa and a piece of biscuit. The natives were called at daybreak, and were usually ready about half an hour after; each sapper collected his party, and saw that they were supplied with tools. . . . . The labourers were extended along the road by an officer, who pointed out what was to be done, the cutlass men cut down the bush, the hand-axe men grubbed up the stubbs, which were so sharp as to cut a boot, the axe men cut down any tree or cut through any that

were across the road. Each sapper carried his rifle and 70 rounds of ammunition and kept his own party at work, the officer moving about amongst them, and directing from time to time what was to be done. At 10 o'clock word was passed along the line to come in, the whole party returned, rations were issued, and the breakfasts, tea, rice and preserved meat, ready by 11 o'clock. At 1 p.m. the men turned out again and worked until it was dark—when they returned to camp, dinner was ready in about half an hour. Large fires were made in front of the *tentes d'abri*, one to every three tents, and a huge fire in the middle of the camp, the men to make these fires and gather the wood having been specially told off. After dinner the rum was served out, and the men smoked, sang glees and turned in about half-past eight."

The telegraph work followed behind the road-making, and was naturally a somewhat difficult operation. Lieutenant Jekyll had charge of this branch, and made a very detailed and interesting report on it. The Sappers were employed in all the skilled work, but for the ordinary labour natives were made use of. Jekyll says :—

"Light work, such as preparing bamboo poles and fixing insulators, they soon got accustomed to, and with supervision did very well; but when it came to digging holes, stretching wire, and cutting trees, a great deal of persuasion had to be used, and the constant presence of white men was necessary to keep them at work. In digging holes they soon gave up spades, and preferred to use pick irons, with which they loosened the earth, removing the loose soil with their hands. While working, the man sat on the ground, and worked between his legs till the hole was as deep as the length of his arm. They were slow to learn any kind of work to which they were unaccustomed, even the simplest operation, such as uncoiling wire along the ground, they were unable to perform for a long time. In carrying loads, they greatly objected to weights in excess of what one man could conveniently take on his head, such for instance as the coils of wire, which weighed upwards of 100 lbs. a-piece. The coils were always slung on bamboos, each coil being borne by two men; but they disliked this method of carriage, and would sometimes take it in turns to carry the whole load, whilst at other times the coils would be laid down and abandoned by the road side. They were, moreover, extremely timid. Many deserted after seeing some old bullet marks in a tree, others after being knocked down by lightning shocks, when handling the wire. This incident was productive of some good, inasmuch as it inspired great respect for the wire, which was henceforth regarded as fetish, and never molested by the natives."

Thunderstorms were a constant source of interruption to the work, such strong induced currents being set up in the wire that it was impossible to touch it for a time.

Some care was necessary in selecting trees to act as telegraph poles. Such as were swayed by the wind being unsuitable, tending to

lead to fracture of the wire. Either they should be so large as to stand quite firm, or so small that their tops could be cut off, and the trunks left as poles. Some trees were so covered with creepers and parasites that the labour of clearance became too great, others were so soft and spongy that they afforded no hold for the nails.

The work of constructing the line had been much impeded by the deficiency of skilled workmen. It had been decided to land as few of the troops as possible, until the roadway was far advanced towards its destination. In accordance with this plan, which was adopted for the preservation of the men's health, only half the body of telegraph constructors had been sent ashore. The stores, moreover, ran short, as the larger proportion were on board H.M.S. *Dromedary*, which did not arrive at Cape Coast until December 31st. These were at once landed, but then began a new set of difficulties. No sooner were sufficient men and stores available than the transport failed. As Jekyll, in his report, observes:—

"Up to this time transport had been abundant, and it was of stores only that we were in want. Now the situation was reversed, stores were in profusion, but there lacked the means of conveying them up the country."

The cause of this was that on January 1st, and daily afterwards, the troops were landed and marched to the front, half a battalion at a time. These absorbed the available transport—

"Meanwhile, in order to preserve the working party from the absolute inaction, which was threatening it, I was endeavouring by the authority of the C.R.E. to raise carriers and labourers on my own account, and in the course of the eight days which followed the arrival of the *Dromedary* succeeded in collecting and despatching three gangs of twenty-five men each, under intelligent head men. There was much difficulty in getting these men, as I had to compete with the Control Department, by whom, apart from their special facilities, large rewards for men were being offered."

By dint of great exertions the line was opened as far as Prahsue on January 24th. Throughout the month of February thunderstorms were very frequent and violent, constantly breaking it down by splitting the insulators. All these drawbacks and delays prevented its being advanced as rapidly as the road, and ultimately it did not reach nearer to the front than Accrofoomue, twenty-three miles to the north of the Prah. This distance was worked with five offices.

Amongst other novelties in scientific warfare the steam sapper was used on this expedition. It seems not to have proved altogether very satisfactory, as we have some touching complaints of its misbehaviour in Captain Buckle's journal.

"31st Oct. Steamed up the hill and through the town (Cape Coast), with the steam sapper, to the intense astonishment of the natives. Got the saw bench to work. In the afternoon was ordered to take an Ashanti prisoner on the engine some two miles out of the town. The engine did not work at all well, her boiler primed, she got short of water, and refused to go up a hill. Altogether it was not a successful trip. And again, on the 4th November, wished her to haul in the afternoon; found two of her tubes leaking and had to desist. The behaviour of this engine has caused much disappointment."

Still, it sometimes appears to have done good work. On November 3rd,

"the traction engine hauled up two of Crease's filters, weighing each two tons, from the beach. It also sawed a good deal of timber, and hauled water from the condenser."

Several other entries appear of the engine sawing timber and doing sundry useful jobs.

The camp at Prahsue, the bridge across the river and the *tête de pont* on the north side, were all completed early in January, and posts were pushed forward in the direction of Coomassie, still about seventy miles distant. There had been more than one attack on the stations whilst on the near side of the river. Indeed, the Ashantis had shown themselves even close to Cape Coast Castle. Now, however, it became a matter of much greater risk to the working parties, as the line drew nearer to the head-quarters of the tribe, and caution became necessary. Still the work went steadily on. Essiamau, Accrowfoomue, and Moinsey were successively reached. A little in advance of the latter was a range of very steep hills which must be crossed, the road at this part having to be cut out of the side of the hill and traced in zigzags. This was a heavy piece of work; but it was most skilfully and successfully accomplished, under the special superintendence of Lieutenant Bell, R.E. A fort was also constructed at this point, and the Engineers, as soon as it was finished, pushed on to Quisah. Thus post after post was established until Insarfue was reached.

"It became apparent," says Major Home, "that Insarfue would be a place of consequence, and from circumstances that the first fight would take place very soon. The men were told that the road must be opened to Quarman, and the Denkeran and Yansie bridged before work stopped that night. This was a distance of about three miles, and there were many swamps and bad pieces of road. Double pay was promised to everyone if this work was accomplished. The road back to Adadwassie was finished and the Denkeran bridged by four o'clock, and by dark, not only was the Yansie bridged but the road was made into Quarman, a fresh road for nearly a quarter of a mile cut through the bush to the

north, and a bridge over the Dunsaboo begun. It now became apparent that a very small advance would produce a collision between the Ashantis and the main column, the head of which advanced to Insarfue, the advanced guard and Engineers having moved on to Quarman."

This was on January 29th, and the following day was spent in pushing still farther forward to within 130 yards of the village of Egginassie, the Ashanti outpost.

Sir Garnet Wolseley now prepared to attack the enemy, with whom he was almost in touch, it having been reported that they were in position at Amoaful. This operation was to take place on January 31st. The advance was to be made in three columns, the centre moving by the native path. The Engineers were to cut roads 300 yards to the right and left of the centre path for the other two columns. Captain Buckle, with one Serjeant and ten Sappers, at the head of forty native workmen, took the lead of the left column, and Lieutenant Bell, with a similar staff, that of the right; Major Home with the two Assistant Engineers, Lieutenants Hearle, R.M.L.I., and Hare, 22nd Regiment, guided the centre; Lieutenant Cotter, R.E., was left at Quarman, with orders to place that post in a state of defence.

The head of the brigade brought up for the attack arrived at 7 a.m., and as soon as the necessary arrangements had been made, the three columns commenced their advance. On reaching the village of Egginassie some shots were fired, and in pushing the centre column forward much opposition was encountered. Major Home then set a party to cut a road in the bush, to the left of the centre line of advance, and by this means turned the Ashanti position. The troops, with the 42nd in advance, pushed forward up the hill towards Amoaful. They were enabled to do this the more easily as the Ashantis had themselves cleared much of the bush in forming their camps. The village was carried about noon, and was at once placed in a state of defence. The Ashantis clung obstinately to the spot, and whilst loopholing the walls one Engineer labourer was killed and two wounded.

On the right Lieutenant Bell's party had cut their road out to the flank, and were shortly met by a very heavy fire, two Sappers being wounded, and eight natives killed or wounded. They succeeded, however, in making a large clearance, and thus assisting the main advance.

On the left Captain Buckle had cut about 300 yards to the front, when his party was also met by a heavy fire, which dropped several of his men, he himself being at the same time most unfortunately killed. This loss caused the direction of the column to waver, and after a short further

advance they cut into the centre road, near the position of the enemy's camp.

Meanwhile the Ashantis had passed round the flank of the attack, and in their turn fell on Quarman, two and a half miles in rear. Here, Lieutenant Cotter, R.E., and his ten Sappers, did good work. For some time they were the only Europeans at the post, which was very smartly assaulted. They succeeded in maintaining themselves until relieved by the Rifle Brigade.

In this affair three officers of Royal Engineers, and two Assistant Engineers, with twenty-nine Non-commissioned Officers and Sappers, were present. Of these one officer was killed, two officers and four Sappers wounded.

Amoaful now became the advanced post, and preparations were made for a further advance. Lieutenant Cotter, Royal Engineers, and Lieutenant Hearle, Assistant Engineer, were left at the place to form a station and place it in a state of defence; all the weakly men were also left, as the further advance was likely to be very rapid. Agemamue was reached at noon on February 2nd, and a small redoubt thrown up that night.

"Work was begun at 7 p.m. By degrees the natives stole off in the dark, and could not be found again. The work was, however, completed at 2.30 a.m., by the Europeans, sappers, and sailors."

On the 3rd the advance was resumed, the baggage having been left at Agemamue. Lieutenant Bell accompanied the 42nd, who were in front.

"A running fight was kept up all day, during which a very large clearing was made by Lieut. Bell, who, with an unarmed and uncovered working party, supported in rear, however, by troops, cut his way into a strongly defensible position occupied by the enemy."

The river Ordah was reached at 3 p.m., and a bridge commenced. The men worked at this all night, having no materials but what grew on the spot. It was ready for the troops by 5 o'clock the next morning.

On February 4th, at 6 a.m., the march was resumed.

"Lieut. Bell, with the advanced guard, got into the village of Ordahsue. Here he was directed to clear a large space—a duty which he performed without being covered in any way, and in which he displayed so much gallantry and courage that he has been specially brought to His Royal Highness's notice as deserving the Victoria Cross." (This he received.)

Ordahsue having been seized, the column again pushed forward, and entered Coomassie just before dark, without any further opposition.

In referring to this rapid advance Major Home reports :—

"During the operations that took place from January 31st, the bush was too thick to admit of troops covering the Engineers, who thus worked without a covering party at all, and exposed often to a double fire, not only from the Ashantis in front, but from their friends behind, who, in the excitement of action, sometimes did not pause to ascertain if the black man in front was an Engineer labourer or an Ashanti."

The advance on Coomassie had been so rapid, that on arrival the troops were much exhausted. The Engineers were so prostrated with their exertions, that they could hardly be induced to make any arrangements for their own comfort. To add to the difficulty, fires broke out in the early part of the night in various quarters, and they had to be aroused to extinguish the flames. This was not successfully accomplished till morning, the fires having been accompanied by several explosions, owing to the Ashantis having in their retreat left powder barrels loose. On the following day Sir Garnet Wolseley directed the Engineers to blow up the palace and burn the town. This was done on January 6th :—

"The roofs, which were well washed after the heavy rains, ignited with great difficulty ; but once on fire, the flames spread rapidly. Lieutenant Bell completed the mines, attached the slow match, and fired them. Two were seen to explode, and a large mass of the palace fell. Capt. Sartorius, who passed two days afterwards, reported the palace as completely ruined. The fetish houses and temples were also burnt. At 9 a.m. the work of destruction was completed, and the Engineers marched out in advance of the rear company of the 42nd."

The return journey was made under the greatest difficulties. Rain had fallen in torrents, and had swollen the streams, so that the bridges began to suffer. That across the Ordah, made on the night of the 3rd, was now under water ; but the troops were nevertheless able to use it for crossing. This, however, was not done without mishaps. The piers and bearers had stood firm, but many of the planks of the roadway had floated up, producing treacherous holes, through which men fell. Some efforts were made to repair it, but there was not time for doing much. Intelligence had reached the front that the bridge across the Prah was in danger, and every effort was made to reach the spot in time to cross it. The men were therefore pushed across the Ordah without waiting for any considerable mending.

"About five o'clock, it became apparent that the bridge would not last much longer, and as the river was rising fast, Sir Archibald Alison ordered the 42nd to strip and ford it. This was safely done, although, as the dark drew on, it was a hazardous operation, the water being up to the men's shoulders. Large fires were lit on the banks, so as to give light.

The men crossed in fours, holding each other's hands, natives who could swim bringing over the arms and clothes, and men with torches being kept on the banks, so as to give as much light as possible."

The Engineers were now pushed one day's march ahead of the troops by starting in the night, and succeeded in restoring the roadway and bridges where damaged. That across the Bahrein river had been completely carried away, and the stream had risen to a height of fourteen feet; but Major Home succeeded in renewing it before the troops arrived at the spot. The telegraph was reached at Accrofoomue on February 10th, and from that time the General was in communication with all the posts along the line. Major Jones was able to report that the bridge across the Prah, which had been in great danger, was now once more secure, and the troops were consequently moved more leisurely. At the same time Sir Garnet Wolseley was naturally anxious to bring them to the coast as rapidly as possible, the jungle being extremely pestilential. He therefore ordered the Engineers to make such additions at each post as would permit their moving down by battalions instead of by wings, as had been the mode of march on the road up. This involved the rapid construction of additional huts at each post. The whole of the line of communication had been under the charge of Major Jones as regarded Engineer work, and the pressure had been very great. Major Home thus speaks of the work done by him:—

"Major Jones had, during the advance, supported the Engineers in front in every way, by sending up tools and provisions, and during the homeward march every post and station was found amply supplied. . . Although debarred from sharing in the final capture of Coomassie, Major Jones contributed greatly to the safe return of the troops, and testimony should be here borne to the large quantity of work he performed."

The work was now over. The telegraphists under Lieutenant Cotter closed up station after station as the troops passed. Major Home, with Lieutenant Bell, accompanied the 28th Company, under Major Jones, in the forced marches which they made in advance, and nothing was left but to hand over the stores to the Central Depôt at Cape Coast. Major Jones and his Company were embarked on board the *Himalaya;* Major Home and Lieutenant Bell in the *Sarmatian;* and Lieutenant Cotter, with the Telegraph detachment, this being the last of the Engineer forces, in the *Manitoban*, on March 4th, 1874. Thus the Ashanti war ended in a complete success, as far as the object of the expedition was concerned. The Ashanti tribe had received a chastisement which they did not soon forget, and the power of England to make her strength felt, even in the most inaccessible spots, was once

more vindicated. This, however, could only be done at the cost of much suffering and sickness. The duty of the Engineer had never before been actively carried on under such depressing conditions. The work done amidst the pestilential swamps which lay between Cape Coast and Coomassie, although not so brilliant as much that has been recorded in the previous pages, still adds one more to the numerous different fields of service in which Engineers have staunchly done their duty to the uttermost, in spite of every obstacle and every difficulty.

CHAPTER XXIV.

South African Wars, 1847-1885.

Kaffir Wars of 1847-1848 and 1850-1853—Captain Tylden and his Native Levy—Attack on the Sappers under Moody at Koonap Hill—Zulu Campaign—Composition of the Columns of Attack—The Isandlwana Disaster—Death of Colonel Durnford—Defence of Rorke's Drift—Advance of Pearson's Column on Ekowe—Wynne's Diary—Wood's Column—Advance on and Battle of Ulundi—Close of the War—Fraser at Majuba Hill—The Bechuanaland Expedition under Major-General Warren, in 1885—Advance to Mafeking—Water Supply—Church Built by the Engineers—Warren's Reception at Capetown.

In all the earlier wars in South Africa the Royal Engineers bore their part, but owing to the peculiar character of the campaigning they were but seldom called on to render that professional assistance which is their special province. It seems therefore scarcely necessary to do more than allude to the work performed by them during the successive Kaffir wars, especially those of 1847-48 and 1850-53. In both of these the duties they carried out were principally those of ordinary infantry officers. We find them sent out in command of patrolling and escort parties, or, as in the case of Captain Tylden, placed at the head of a force of local levies. Others, like Captains Jesse and Stokes, served on the staff of the army as Assistant Quartermaster-Generals.

So much was this the case that, when the question was mooted before Lord Sandhurst's Committee as to the capability of the Engineers to serve on occasion as ordinary infantry, these wars were quoted to prove their utility in that respect. It is true that here and there they were engaged in road-making and bridging, though these were but very subordinate portions of their work. Thus a small party of Sappers assisted by linesmen were employed, under Lieutenant Stokes, opening a road for wagons in the Amatola mountains, and throwing a temporary bridge across the Keiskama. On another occasion a few Sappers under Captain Walpole transported men and stores across the Kei on a raft of casks which they had constructed. Services such as these were, however, but seldom called for; and a study of the Kaffir wars shows that the principal duty of the Engineers was to act in combination with the troops of the line.

The despatches of Sir Harry Smith are full of the employment of Engineers in this capacity, of which the following extracts may be taken as specimens :—

"While these operations were in progress I detached Captain Moody, Royal Engineers, with a strong detachment, from King William's Town to post himself between Murray's Krantz and the Isele Berg, to intercept fugitives driven before Colonel Eyre."

"I at the same time detached from King William's Town Captain Robertson, Royal Engineers, in command of a patrol of 250 men to complete the work of devastation through the Isele Berg."

Captain Tylden had been placed at the head of a large body of men raised at Whittlesea, with which he did good service. He and his levy formed one of four columns ordered by Major-General Somerset, to converge to a common centre in a combined movement into the Amatola Mountains. This was effected between the June 26th and 30th, 1851, and proved perfectly successful. We also read in one of Sir Harry Smith's despatches—

"Captain Tylden, R.E., whose force from Whittlesea was attached to Major General Somerset, thus reports : The party who ascended the left flank and first turned the cattle were led by Commandant J. Holden Bowker and Lieutenants Mason and Warner, and that on the right by Captain Austen and Lieutenant Arnold, North Victoria Native Levy ; and I have on this occasion brought the names of these officers to your notice on account of the gallant and deliberate manner in which 950 head of cattle and 50 horses were wrested from the enemy in the face of a powerful resistance."

In the month of May, 1852, a serious disaster befel a party of Sappers under Captain Moody, who were escorting an ammunition train from Graham's Town to the frontier. At a spot called Koonap Hill they were attacked by the enemy, who were lying in ambush. Captain King, 74th Highlanders, in his "Campaigning in Kaffirland," thus describes the incident :—

"At Fort Brown, whither the dead and wounded had been conveyed, we found a fatigue party digging graves for those who had fallen. The wagons which had been brought off, riddled with balls, stood in the square. From Captain Moody, R.E., the officer commanding the party at the time of the attack, I had a full account of the affair. It appeared that when nearly half way up the hill a volley was suddenly fired on the escort from the bush on the lower side, into the advance guard, killing four of them at once. The attack then became general, the Sappers fighting gallantly under their Captain, making a fresh stand as they were driven from wagon to wagon, till, overpowered by numbers, and having seven killed and nine wounded out of thirty, they were forced to retreat to an empty house near the ruins of old Koonap

Post. There they barricaded themselves and remained for about an hour, when relief arrived from Fort Brown, where the sound of the firing had given the alarm to the garrison. . . . . Many of the enemy, who were principally rebel Hottentots, had been killed in the skirmish" (pp. 236, 237).

Captain King makes several allusions to the Engineers in his work :—

"A large native force under Capt. Tylden, R.E., was also placed in position in the Windvogelberg, in order to prevent them making for the country beyond the Kei" (p. 55).

"In a few minutes the clattering of horses was heard rapidly approaching, and the challenge of the sentinel, from whose platform we looked on a mass of horsemen, was answered by the familiar voice of the gallant Tylden. He had come, with a large force of mounted men, to be in readiness to move with us in the combined attack on the Waterkloof, to which we were anxiously looking forward" (p. 212).

"Whittlesea, which is our most remote Frontier Post, has been rendered famous by a series of attacks which it sustained and gallantly withstood under Capt. Tylden, R.E., who no fewer than thirteen times defeated and put to flight large attacking bodies of Tambookies and Rebel Hottentots" (p. 285.)

"A party of Engineer officers being ordered to proceed with a small escort to the drift on the Caledon River, some miles in front, to survey its practicability and the nature of the country in case of our further advance, I accompanied them as a volunteer . . . . After the drift had been carefully examined by Siborne, R.E., who swam his horse across the swollen stream, and Tylden and Stanton had taken the necessary points and bearings for their survey of the country, &c., &c." (p. 318).

It may also be recorded that Captain Jervois, R.E., was employed in an extended survey throughout the scene of the war of 1846-7, a work of considerable danger, which he performed in an admirable manner.

The Engineers engaged in the various campaigns were as follows :—

In 1834-5.—Lieutenant Montgomery Williams.

In 1846-7.—Lieutenant-Colonel Walpole, Captains Gibb and Howarth, Second Captains Bourchier, W. Jervois, Owen, and J. Stokes.

In 1850-3.—Lieutenant-Colonel Cole, Captains Stace, Fenwick, and Robertson, Second Captains Jesse, H. C. Moody, J. Stokes, and Tylden, Lieutenants J. Inglis, Stanton, Belfield, J. H. Smith, Fowler and Siborne.

The development of our possessions in South Africa was from this time continuous, and culminated in the annexation of the

Transvaal in 1878. In consequence of this transaction we became involved in difficulties with the Zulus, which led to the disastrous war of 1879, many of the details of which are of much interest to the Engineer.

It having been decided that an advance should be made into Zululand for the attack of Ketchwayo and the capture of Ulundi, two field companies of the Engineers (the 2nd and the 5th) embarked for South Africa on December 2nd, 1878, and landed at Durban on January 4th, 1879, for the reinforcement of the corps in South Africa. This had previously only consisted of the 7th Company, commanded by Major F. W. Nixon, who had under him Lieutenants F. H. MacDowel and J. Clarke.

Colonel A. W. Durnford, assisted by Captain A. H. Hine, who was at the time Colonial Engineer, had organized and equipped three Companies of Native Pioneers. These each consisted of 1 Captain and 2 Subalterns (European), and 4 Serjeants and 96 Sappers (native). In each company twenty-five men were armed with the Martini-Henry rifle, the remainder bearing assegais and shields. Each man also carried a tool slung. The equipment of tools, forges, dynamite, &c., was loaded in two-wheeled ox-carts. The officers were gentlemen employed in the Colonial Engineers department.

When the expeditionary force was organized, Colonel Durnford took command of the entire Natal Native Contingent, consisting of three battalions of 1,000 men each, with 450 mounted men and a rocket battery under Captain Russell, R.A. From long residence in the colony and from having commanded similar contingents during previous outbreaks, Colonel Durnford had acquired great influence over the natives of Natal and Basutoland, and it was felt that no one else was so well qualified to handle this auxiliary force.

Colonel Hassard was Commanding Royal Engineer, and Lieutenant J. C. Baxter was Adjutant. The other officers and Companies were divided amongst the three columns which were intended to penetrate into the district from different points.

Colonel E. Wood commanded that which was to start from Utrecht; with him was Major Moysey. Colonel Glyn's column was to start from Helpmakaar and Rorke's Drift; with him was the 5th Field Company Royal Engineers, with Captain W. P. Jones, Lieutenants R. M. Chard, R. Da C. Porter, and C. E. Commeline, also two Companies of Native Pioneers commanded by Lieutenant F. H. Macdowel.

A third column, under Colonel Pearson, was to cross the Tugela river near its mouth. With him was the 2nd Field Company,

with Captain W. R. C. Wynne, Lieutenants D. C. Courtney, H. B. Willock, and C. E. Haynes; also one Company of Native Pioneers under Lieutenant T. R. Main.

Lieutenants V. J. Yorke and Brice were appointed Assistant Engineers, and took charge of the bridge equipment for crossing the Tudela. Lieutenant-General Lord Chelmsford was in command of the combined force.

The main Engineer interest in the campaign centres in the catastrophe of Isandlwana and the defence of Rorke's Drift, in the former of which Colonel A. Durnford met his glorious death, and at the latter Lieutenant Chard made an equally glorious and at the same time successful resistance to an attack by overwhelming numbers of Zulus. The column under Colonel Glyn, which the Lieutenant-General Commanding accompanied, crossed the Buffalo river at Rorke's Drift on January 20th, advanced as far as Isandlwana and there encamped. On the same day Colonel Durnford arrived at Rorke's Drift with five troops of the Mounted Natives, Russell's rocket battery, and two companies of the contingent infantry. On the morning of the 22nd he received an order from Lord Chelmsford to move up to Isandlwana camp with his mounted men and rocket battery. He started for that point at about 8 a.m. and reached his destination at 11 a.m. There he found that a number of Zulus had been seen on the top of the adjacent hills, and that an attack was expected. The troops at Isandlwana at the time consisted of six companies of the 24th Regiment, two guns of Royal Artillery, and a few mounted men. The remainder of the column had moved on with Lord Chelmsford some miles to the front, with the object of attacking a Zulu Impi supposed to be collected in the vicinity.

The mounted men of Lonsdale's Native Contingent were on outpost duty as scouts, and messages were constantly being received from them:—"The enemy are in force behind the hills to the left;" "The enemy are in three columns;" "The columns are separating, one moving to the left rear and one towards the General."

Durnford now decided on quitting the camp with his mounted men, and endeavouring to prevent the column referred to from joining the Impi which it was imagined was at the time engaged with the troops under Lord Chelmsford. He sent two troops of the Mounted Natives on to the hills at the left, to ascertain more clearly the enemy's movements, and he himself with the remaining two troops, and Russell's rocket battery escorted by a Company of the Native Contingent, moved to the front. Having proceeded some distance he received a report that an immense Impi was behind the hills to his left, and almost immediately afterwards the

Zulus appeared in great strength in his front, and on the left. They were in skirmishing order, but ten or twelve deep, with supports close behind. They advanced with extreme rapidity, and opened fire when about 800 yards distant. Durnford retired slowly until he reached a donga or watercourse, where he took up a position. Finding the strength of the enemy too great for him to hold this point, he resumed his retreat, keeping his men in skirmishing order, and maintaining a steady fire.

The rocket battery had not been able to advance as rapidly as Durnford with his two troops had done. They, hearing heavy firing on their left, and learning that the enemy were in that quarter, changed direction to their left. Before reaching the crest of the hills they were attacked on all sides. Only one rocket was fired, and then the Zulus were on them; the first volley dispersed the natives and mules of the troop, leaving the remainder to maintain a hand-to-hand combat, in which Captain Russell was killed. Durnford, in his retreat, came upon the remains of the rocket battery, and for a time drove the Zulus back. The whole body continued to retire as steadily as they could towards the camp, until they reached a second donga not very far in front of the main position. Here a desperate stand was made, but by this time the Zulus had turned the whole position, and were in the midst of the 24th. All further cohesion was lost. Those who survived had commenced a headlong rush on the road leading back to the Buffalo river, and a great number of Durnford's men joined in the flight. He succeeded in rallying a few of the bravest and most determined of his levy, and stood firm in the position he occupied. He saw at a glance that the only chance for the fugitives was to detain the Zulus as long as possible, and resolved by the sacrifice of his life to hold the point to the last. He could easily have escaped had he chosen, for he was well mounted; but, had he done so, the lives of all on foot must have been lost. He and those he was able to gather round him died where they stood, and thereby set an example of noble self-devotion, which was not long in bearing fruit. It was only in the succeeding year Henn followed in his footsteps, and in a precisely similar manner under the same circumstances, at the disaster of Maiwand, gave up his life to save those of his flying comrades. Well may the Corps be proud of these two heroes, and love to commemorate the incidents of their heroic stand. They are, it is fondly hoped, only *primi inter pares;* and, should occasion again call for it, the Engineers will not be wanting in the supply of men capable and willing to follow these glorious examples. Meanwhile the names of Durnford and Henn stand out in the foremost rank of those who

have scorned to seek safety in flight, and have known how to die with their faces to the foe.

In this fatal field, in addition to Colonel Durnford, Lieutenant MacDowel lost his life, as did also four Non-commissioned Officers and Sappers of the 5th Company, who had been brought up to Isandlwana, on the very morning.

We must now turn to the incidents by which Lieutenant Chard's name has become connected with the memorable defence of Rorke's Drift. He was with the 5th Company, under Captain Jones, marching up the country from Durban towards Helpmakaar, when an order arrived from Lord Chelmsford, that an officer and four Sappers were to be pushed forward as rapidly as possible, in order to join the column, then about to enter Zululand from Rorke's Drift. Chard, being the senior Subaltern, elected to proceed in charge of the detachment, who were placed on light carts, and arrived at Rorke's Drift on January 21st. He proceeded with his men early on the 22nd to Isandlwana, where he found that Lord Chelmsford had marched out with the larger part of the force, but had left orders that the Sappers should remain in the camp, and that Chard should be stationed at Rorke's Drift, to fortify and maintain the post covering the crossing of the river, which was effected by means of ponts or ferries. He left his men as ordered (who all lost their lives in the disaster), and on the road back met Durnford on his march to the front. He informed that officer that the Zulus appeared to be threatening the camp, and was requested to convey a message to Captain Russell, who was about a mile in rear, to hurry up with his rocket battery. This he did, and then returned to the Drift, where he was placed in command of the small party at the station, by Major Spalding, who was leaving for Helpmakaar.

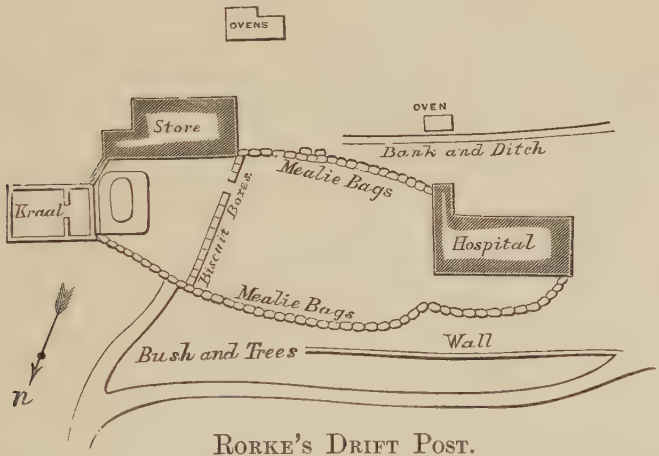
In his report of what followed, he says :—

"At 3.15 p.m. that day, I was watching at the ponts, when two men came towards us from Zululand at a gallop. They shouted out and were taken across the river, and I was then informed by one of them—Lieut. Adendorff, of Commandant Lonsdale's regiment, who afterwards remained to assist in the defence, of the disaster befallen at the Isandula Camp, and that the Zulus were advancing upon Rorke's Drift." . . . . . "I gave instructions to strike tents, and to put all stores into the wagons, while I instantly made my way to the Commisariat store, and there found that a note had been received from the third column stating that the enemy was advancing in force against our post, which we were to strengthen and hold at all costs."

A company of the 24th Regiment, under Lieutenant Bromhead, was at the station, together with some details and detached men. The following were also present :—Surgeon Reynolds, Acting-

Commissary Officer Dalton, Assistant-Commissary Dunne, Mr. Byrne, Commissariat Department, Lieutenant Adendorff, of Lonsdale's regiment, and the Rev. G. Smith, with 131 Non-commissioned Officers and men. This formed the entire garrison. There had also been present a detachment of the Natal Native Contingent, under Captain Stephenson, but both officer and men left the post and made their way to Helpmakaar. After this desertion, Chard writes—

"I saw that our line of defence was too extended for the small number of men now left, and at once commenced an inner entrenchment of biscuit boxes, out of which we had soon completed a wall two boxes high."



Rorke's Drift Post.

The post of Rorke's drift was thus composed. There were two buildings, the store and the hospital, standing about 50 yards apart, running east and west, the store being to the east and projecting beyond the alignment of the hospital, thus flanking it. The inner side of the store was connected with the outer face of the hospital by a wall of mealie bags, with two wagons in the centre. Another of similar construction ran from the far corner of the inner face of the hospital, enclosing a considerable space and terminating at the further extremity of the store, where stood a well-built kraal, which was embraced in the general scheme of defence. The wall of biscuit boxes built by Chard to reduce the extent of the space to be defended ran from the corner of the store nearest the hospital, to meet the wall last described, and, as events proved, was the means of securing the defence after that

building was captured. The tale may be taken up in Chard's own words:—

"About 4.20 p.m. five or six hundred of the enemy came suddenly in sight around the hill to the south. They advanced at a run against our south wall, but were met by a well-sustained fire; yet, notwithstanding heavy loss, they continued to advance till within fifty yards of the wall, when their leading men encountered such a hot fire from our front, with a cross one from the store, that they were checked. Taking advantage, however, of the cover afforded by the cook-house and the ovens" (these were detached buildings to the south of the post), "they kept up thence heavy musketry volleys; the greater number, however, without stopping at all moved on towards their left, round our hospital and thence made a rush upon the northwest wall and our breastwork of mealie bags. After a short but desperate struggle these assailants were driven back with heavy loss into the bush around our works. . . . . Another body advancing somewhat more to the left than those who first attacked us occupied a garden in the hollow of the road, and also the bush beyond it in great force, taking special advantage of the bush which we had not had time to cut down. The enemy was thus able to advance close to our works, and in this part soon held one whole side of wall, while we on the other kept back a series of desperate assaults, which were made on a line extending from the hospital all along the wall as far as the bush. . . . . All this time the enemy had been attempting to force the hospital, and shortly afterwards did set fire to the roof. The garrison of the hospital defended the place room by room, our men bringing out all the sick who could be moved before they retired. Private Williams, Hook, R. Jones and W. Jones of the 24th Regiment were the last four men to leave, holding the doorway against the Zulus with bayonets, their ammunition being quite expended. . . . . Seeing the hospital burning and desperate attempts being made by the enemy to fire the roof of our stores, we now converted two mealie bag heaps into a sort of redoubt, which gave a second line of fire all along, Assistant-Commissary Dunne working hard at this, though much exposed, thus rendering most valuable assistance. Darkness then came on. We were completely surrounded, and after several furious attempts had been gallantly repulsed we were eventually forced to retire to the middle and then to the inner wall of our kraal" (this kraal was divided into two unequal rectangles by a division wall) "on the east of the position we first had. We were sustaining throughout all this a desultory fire kept up all night, and several assaults were attempted but always repulsed with vigour, the attacks continuing till after midnight, our men firing with the greatest coolness, not wasting a single shot. The light afforded by the burning hospital proved a great advantage. At four a.m. on the 23rd January firing ceased, and at daybreak the enemy were passing out of sight, over the hill to the south-west."

Such is the succinct account of this memorable defence, as given by the chief actor therein. It requires no amplification or

picturesque development to add to its impressiveness. As was well said of it by the "Cape Argus"—

"The despatch is written by a simple subaltern of Engineers, and is couched in the plainest terms; but it reads with an eloquence words alone could not give, and tells a story that will go down to posterity among the glorious traditions of the heroes of the British race. . . . . Any man may be a hero in the sense of doing a brave thing in a moment; but the highest degree of heroism requires several qualities besides physical courage. Fortitude in the face of apparently overwhelming difficulties, strict obedience to duty, the calm courage that accepts labour when necessary as equal to fighting, endurance under seemingly crushing odds, these and other qualities were displayed at Rorke's Drift by Lieut. Chard and his companions."

It remains only to give the statistics of numbers and casualties. We have said that there were, all told, 131 Non-commissioned Officers and men present; but it must be remembered that of these thirty-five were sick in hospital, very few of whom were capable of assisting in the defence. The Zulus numbered about 3,000, and left behind them 350 dead. Their wounded were removed by them when they retired. Of the little garrison seventeen were killed and ten wounded.

It is no exaggeration to say that but for this heroic and successful defence, not only would the remainder of the third column, which had escaped the disaster of Isandlwana, have been cut off, but the torrent of Zulu invasion would have poured into Natal with results that are frightful to contemplate. Lieutenant Chard was promoted "to be Captain Supernumerary to the Establishment in recognition of his gallant services in the defence of Rorke's Drift Post against the attack of the Zulus," and in the same Gazette he was made a Brevet Major. He also received the Victoria Cross.

The disastrous commencement of the campaign seriously jeopardized the safety of the column under Colonel Pearson, which, having crossed at the mouth of the Tugela, had advanced northward as far as Ekowe.

Before leaving Natal, a work had been thrown up on that side of the river called Fort Pearson; and, as soon as the Tugela had been passed, Wynne and his Company of Sappers were employed in the construction of another on the Zululand side, which received the name of Fort Tenedos. On January 18th the column started on their march, and, after a sharp fight at Inyezane on the 22nd, reached Ekowe on the following day. This had been a Norwegian Mission station, and was abandoned on account of the war. It consisted of a church and three other buildings, all of sun-dried brick. The church had a corrugated iron roof; the other

houses were thatched. This point was selected as a depôt for stores, and was to be fortified accordingly. Work had been begun with that object when, on the 26th, news arrived of the defeat of No. 3 Column, but without any trustworthy details.

On the 28th Wynne in his diary recorded—

"At 10 a.m. telegram received from General Lord Chelmsford, hinting at the occurrence of a disaster, and stating that he had found it necessary to retire to the frontier; that all former plans had been given up; that Colonel Pearson must expect the Zulu force to bear down upon his column, and leaving him full discretion to retire upon the Tugela or hold his position. At a meeting of Commanding Officers, to which I was called, I found it had been pretty well determined to retreat at once, leaving all standing. The fort being in a tolerably advanced state, I could not concur in this decision, looking upon such a retreat as hazardous in itself, and the moral effect of it to be greatly deprecated. I therefore was in favour of remaining and strengthening our position to the utmost. It was, however, a question of provisions and ammunition; and about the sufficiency of these, for holding out for any length of time, there was some uncertainty. At this point Col. Walker, A.A.G., and Capt. Macgregor, A.Q.M.G., came in, and, being decidedly of the same opinion as myself, the question was again opened, and, after a short discussion, it was determined to remain, sending back to the Tugela the mounted troops."

Fortunately, on that same evening a convoy of provisions arrived in seventy-two wagons, with three Companies of the 99th and two Companies of the Buffs.

The decision to hold the fort having been arrived at, every effort was used to render it secure. Wynne's diary is full of detail of the labour expended by the troops, under the superintendence of his brother officers and himself, assisted by the Non-commissioned Officers and Sappers of his company, until at length Fort Ekowe became a really formidable work. One point of interest remains to be related in connection with it.

The garrison being cooped up within the space occupied by their lines, and the whole of the country between Ekowe and the Tugela being in the hands of the Zulus, communication with the rear was completely cut off. Under these circumstances Lieutenant C. Haynes, R.E., who was at the base on the Tugela, suggested the possibility of flashing signals to the beleaguered force. His idea was somewhat scouted by the authorities, still he was permitted to make the effort. The difficulty lay in the improbability of attracting the attention of those within the fort. When all was ready, signalling was begun, and was continued with patience day by day whenever a gleam of sunshine was available. For a whole week no indication was obtained that the flashes were

observed, and it was not till long after a less persevering man would have abandoned the trial that the first answering gleam was obtained. It was an unpleasant and anxious task watching on an exposed hill-top for so long, but the reward of success was great, and Haynes had the gratification of receiving the personal thanks of Lord Chelmsford for his ingenuity and patience. We find the following entries in Wynne's diary on the subject :—

"Sunday, March 2nd. Heliograph signals observed in the direction of the Tugela at about 3 p.m. No message made out. Endeavoured to flash sun's rays back.

"March 3rd. To-day the signalling from the Tugela was again observed, and some words deciphered of which the import, though vague, seemed to be that a convoy was to be expected on the 13th inst. with 1,000 men, and that when aware of its approach Colonel Pearson was to sally out with the surplus of the garrison. This, of course, caused much excitement and canvassing of the real purport of the message, and many were the endeavours to flash something back with hand mirrors, &c. I determined to try and effect communication by means of a large screen raised above the ground, revolving on horizontal pivots, which, being brought alternately to a horizontal and vertical position in front of the place to be signalled to, should produce dashes and dots through the spaces of time of its appearances."

Wynne had much trouble with his apparatus before he got it into working order, owing to the damage caused by tempestuous weather. At length on March 10th is the entry—

"We signalled two or three messages to the Tugela signalling station. Signalling from thence was kept up for two or three hours."

On the following day he made his last entry in his diary, which leaves off in the middle of a sentence—

"Had an attack of diarrhœa during the night; weak in the morning. Started at 7.30 a.m. with——"

His sickness increased very rapidly, and on the relief of Ekowe on April 4th, he was moved in a cart to the Tugela River; but the frightful jolting over the rough roads proved too much for him, and he died near Fort Pearson on April 9th, 1879. Colonel Pearson, in his despatch of that day, written before he knew of Wynne's death, says—

"The Royal Engineers, of course, took a very prominent part in the construction of Fort Ekowe. Captain Wynne's illness is much to be deplored. I consider him a most valuable officer, and his illness is entirely due to over-exertion at a time when he was in very indifferent health."

It has already been stated that Major Moysey was attached to Colonel Wood's column. At the outbreak of the war he was at

Pretoria, but he joined Wood at Utrecht with one Serjeant and eleven Sappers of the 7th Company. It is not necessary to trace the movements of this column with any detail, the Engineer force with it being so small. Moysey designed and carried out the construction of Fort Kambula, but he was not present when it was attacked on March 29th, having been sent back a few days before to superintend the strengthening of Fort Amiel, and he did not return to Kambula till April 1st. Consequently only Serjeant R. Wood and ten of the Sappers were in action on that day.

When the news of the check which had been received by Lord Chelmsford's forces arrived in England, immediate steps were taken to hurry out reinforcements sufficiently numerous to admit of an active renewal of the war. The Engineers were strengthened by the 30th Field Company under Lieutenant-Colonel Harrison, with Captain Blood, Lieutenants Watkins, Sherrard, MacKean, and Littledale; the right half of the C, or Telegraph Troop, under Major Hamilton, Lieutenants Hare, MacGregor, Rich, and Bond. The following officers were also sent out:—Lieutenant-Colonel Steward, as Commanding Royal Engineer to the force, Lieutenant-Colonels Webber and Hale, Captains Anstey, Heneage, Lieutenants James, Cameron, Penrose, and Brotherton.

When Lord Chelmsford decided on making his forward movement on Ulundi, after the arrival of his reinforcements, he formed a flying column under Colonel Wood, and a Division (called the 2nd) under his own command. The flying column, with Moysey attached, left Kambula on May 30th, and was shortly after joined by the 5th Company Royal Engineers under Captain Jones. The 2nd Company was posted at first to Lord Chelmsford's Division, but this was also eventually sent to Wood's force, it being considered advisable to have as many Engineers as possible with the troops in front.

Lieutenant Porter, of the 5th Company, wrote a diary of the march on Ulundi, from which the following extracts are taken:—

"Monday, June 16th. Wood crossed over to our side of the river to-day, and encamped just below the forts. We joined his laager in the afternoon.

"June 18th. Reveillé at 4 a.m., started at 6.15 a.m.; marched only 5 miles. Had two difficult drifts to make, hence the short march. . . . In the afternoon we commenced a fort where a new depôt is to be formed. . . .

"June 21st. Started half-an-hour later than usual, as the enemy was reported to be in sight. . . . We had a very steep hill to ascend, then a very steep descent. At the bottom we had to cross three baddish dongas, and a little further on we had to cross the river. All this

necessitated a good deal of work, and though we only went about 5 miles, we did not get in very early. . . .

"June 22nd. The road proved very difficult, and we only did three miles. First we had to ascend a very steep hill, the wagons forming laager, and outspanning as they came up. In the meantime the Company was at work about 1½ mile further on, blasting a passage through a rocky cliff. . . . A big laager was formed at the foot of the hill. About half a mile further on, on a neck connecting the hill we had descended with another which we shall have to climb when we move on, was a small laager in which we (the 2nd Company, as well as ours, for that has now joined the flying column) and the 13th are encamped. We commenced a new fort here, to be called Fort Evelyn. It is built chiefly of sods, with a small ditch outside, and is a pentagon without any flanking arrangements. Command 6′ ditch 8′, to be increased as time may permit.

"June 24th. Marched at 6.30 a.m. Road again very difficult. It wound about like a snake, up and down steep hills, so that progress was very slow, and drag ropes in constant use. . . . From the hills Ulundi can be seen, apparently about 20 miles off as the crow flies."

Similar entries occur until Ulundi was nearly reached.

"July 2nd. Commenced building a small pentagonal stone fort. The ideas for the future are these. To-morrow or next day the army is to cross the Umvalosi, without wagons, except such as are necessary for ammunition and tools. The men are to carry two days' provisions. The wagons are to be left behind in laager, one battalion guarding them. All day long we could see large numbers of Zulus in the big kraals across the river. Some of them have been dancing war dances.

"July 4th. Started in the dark to cross the river. . . . The river was about 50 yards wide, nowhere more than eighteen inches deep; the bottom sandy. After crossing, we commenced at once to ascend through a somewhat broken country towards the open plains where the kraals lay. . . . About 2 miles from the river we got into open grass land, and here we formed a large square two deep. The Engineers" (only the 5th Company, as the 2nd Company had been left on the other side of the river with the force guarding the laager) "were in reserve on the front face, behind the Gatlings. About 8 o'clock large bodies of the enemy began to appear, both to the right and left of us, and soon after on our front also. We did not see any in our rear, but we heard afterwards from the garrison left behind in the laager, that a very large force, estimated at about 10,000 men, had passed down the valley of the river shortly after we had crossed. It appears from the account of prisoners taken during the battle, that the Zulus intended to attack the camp that morning. For this purpose a large body was sent down the river; this afterwards came up on our rear. The two other bodies began working through the hills on each flank, and had we not advanced ourselves, a concentric attack would have been made. As it was, we came out into the open, to the vast astonishment of the Zulus, who thought we were moonstruck and delivered into their hands. They

accordingly made arrangements to surround us on the line of march. The people on the two flanks turned about and came abreast of us at a distance of a mile and a half, while the body originally intended to act as a reserve now attacked our front face. Altogether there were about 20,000 of the enemy present, but only about half of that number ever got close to us. At 8.50 a.m. our cavalry on the front and flanks became engaged, and about ten minutes after they had to retire on the main body and get inside the square. About this time the first bullets began to whistle about our heads. By 9.5 a.m. all four faces were attacked, and a heavy fire opened by both sides. About 9.25 a.m. the pressure on the left of the left face began to be rather great, and our company was moved there in support. At 9.35 a.m. the Zulus retired, and a few minutes afterwards the cavalry was sent out to follow them up. . . . Notwithstanding the somewhat heavy fire to which my company was exposed, we had only a serjeant wounded, and this seemed the more surprising, as a good many bullets struck the ground among us. The N. N. Pioneers next to us had 2 officers and 3 men hit, whilst the N. I. behind us had 7 men hit. . . . About 11 o'clock the cavalry set fire to Ulundi, and the army was marched towards the kraal to see the burning."

The Engineers within the square during the battle were—Colonel Harrison, A.Q.M.G., Lieutenant W. H. James, on special service, Major Moysey, Captain Anstey ; the 5th Company R.E., officered by Captain Jones, Major Chard, Lieutenants Porter and Commeline ; also Serjeant Wood and six Sappers of the 7th Company. It was Serjeant Wood who was wounded.

In the laager on the other side of the river were left—Captain D. C. Courtney, Lieutenants Haynes and Main of the 2nd Company, and Lieutenant Macgregor of the C Troop.

The destruction of the King's kraal and the severe defeat the Zulus had sustained closed the war, before Sir Garnet Wolseley was able to take any active part in the operations.

The following rewards were granted to Royal Engineer officers for their services in the campaign :—

Colonel Harrison to be a C.B., Major Moysey to be a Lieutenant-Colonel, Captains B. Blood and W. P. Jones to be Majors. Captain Wynne was also promoted to the rank of Major, to take effect from April 2nd, 1879.

When the fighting ceased the Engineers were employed in surveying the country, until the troops were gradually withdrawn, and the new political arrangements devised by Sir Garnet allowed to take effect.

The unfortunate Boer War in the Transvaal in 1881 needs but slight mention. At its outbreak the 2nd Field Company, with Major Le Mesurier, Lieutenants Littledale and Commeline, were at Pretoria, where they were blockaded during the war ; Major

Fraser and Lieutenant Brotherton were in Natal, and joined Major-General Colley's force in its advance on Lang's Nek. The only point in which the Engineers appear to have been seriously concerned was in the person of Major T. Fraser, R.E., who served as Deputy Assistant Quartermaster-General under Major-General Colley, and in that capacity accompanied him in his attempt upon the Majuba Hill. Major Fraser gave two accounts of the battle, one in his official report, the other in a private letter written on March 2nd. As the latter is by far the most graphic, and enters into details which are not referred to in the official narrative, it will probably be interesting that some extracts from it should be quoted in preference to the despatch. After giving an account of all the preliminary arrangements made by order of General Colley, and of the start of the column, he continues:—

"The night was moonless, but with good starlight. I never had such a climb before, but we (the General, Stewart, and I) knew what we risked if we failed to reach in time, and before daylight. So I shoved on, on my hands and knees. Colley was so eager, he followed close behind with Stewart. The stones were piled one on another like the bottom of a torrent, but still we made way. As we neared the top, remembering we had seen the night before a piquet on the point we were approaching, I took a rifle from a 58th man behind, and got on top at 3.40 a.m., feeling rather foolish at finding no one. I at once extended the 58th as they came up. . . . The General sent us down to hurry up the men. We went down to the two worst places, and each dragged up rifles and entrenching tools till we all got up; but the men were very done, and the General too. . . . When Stewart and I returned to the top about 5.30 a.m. we found the men extended round the brow, which was, roughly speaking, a square of about 300 yards side, with a hollow basin in the centre, the slopes very steep all round, and in many places too precipitous to be got up. As soon as I looked down on Lang's Nek I saw that they must go or we. . . . . We saw the Boers break up their three or four wagon laagers and inspan their oxen, then they moved mounted and dismounted reinforcements to the hill. . . . . At about 11.30 or 11.45 a.m. Hamilton of the 92nd, who was in charge of the shooting line on part of the crest, told me they could no longer see the Boers, who had walked up out of sight. I knew what that meant, and at once told him to look out for a rush. Almost at once there was a call for reinforcements. . . . The Boers now advanced on us in great numbers, firing with extraordinary rapidity. The two Highlanders on my right and left fell dead shot through the head as they rose to fire. We could see nothing but rifle muzzles and smoke. . . . . I looked to the General, and saw him with a cluster of men round him, with his face to the enemy, retiring, about twenty yards from the line. It was just then he was shot dead through the forehead. The miserable sense of defeat and exhaustion that followed the last thirty hours of work made me indifferent to everything. I moved slowly across the open to my right

front to a point near where we had entered, and near the left of our last line. . . . There was almost a precipice before me, 200 or 300 feet high; but any risk was better than to be taken prisoner, there were no men to rally, so I went down. A fresh firing party opened on me from below; their shooting was admirable; indeed, even then one could not help admiring their gallant attack. I got to a ledge with a little recess of rock. They splashed their bullets on both sides of me, and I slipped and rolled down over and over. I dropped both sword and revolver, but clutched at the latter as the more useful weapon, later on. Seeing me roll, they thought me dead and left me. I went down till I came to a sheer rock, about fifteen feet high, over which I went, breaking my fall by a branch on the top, and at the bottom I found I was unhurt."

Fraser lay where he was till dark, and then started in the endeavour to reach camp. He gives a graphic account of the difficulties and perils he encountered. He had a compass with him, and this he was able to examine by the light of some glow-worms, which he caught for the purpose. At length as day dawned he found himself once more at the foot of the Majuba Hill.

"I went on with my back to it, and suddenly found myself behind (that is north of) Lang's Nek, in the Boer position. I made at once for a burn where was a fall and some trees, and took shelter, as of course it would have been impossible to cross in the day; this was about 6 a.m. It is not often I have had 12 hours to do nothing in. . . . It was now Monday afternoon, and except some biscuits on Sunday at 6 a.m. I had had nothing since Saturday."

At dusk he started again, and contrived to pass through the enemy's position undetected, and at length stumbled upon a house lighted up. This turned out to be a farm within the British lines, and here he obtained shelter until he was able to rejoin at head-quarters. His arrival there caused no little surprise, as he had been reported missing, and was naturally considered to have been killed.

Major-General Sir Evelyn Wood wrote thus of Major Fraser whilst forwarding the official report furnished by him:—

"In submitting the accompanying Report from Major Fraser, R.E., the senior effective officer remaining from those engaged on the 27th February, I desire to bring to your notice the good service rendered by this officer. After being the foremost to scale the mountain he descended again for the purpose of hurrying up the men, and was one of the last officers to quit the ridge. While in the act of withdrawing he fell over a rock and injured his hand, but with great endurance and determination he walked from 1 p.m. on Sunday until 2 a.m. on Tuesday without tasting food, ultimately regaining our lines through the Boer position."

Fresh troops, including the 7th Field Company of Royal Engineers under Major Merriman, were hurried out to Natal, and

pushed forward to the vicinity of Lang's Nek; but before any further action could be taken, peace was made by a complete surrender of all our claims on the Transvaal, and the Company returned to England at the end of the year.

The Bechuanaland Expedition of 1885, which was commanded by an Engineer, and the most important details of which were worked out by men of that service, forms a fitting conclusion to the military history of the Corps in connection with South Africa. Sir Charles Warren had already shown his great aptitude for dealing with the native tribes, both in Griqualand and Bechuanaland;* and it was with the warm approval of the main body of the colonists that he was selected for the purpose of commanding a column to advance rapidly into Bechuanaland, and there settle the difficulties that had arisen.

"To crown these reasons there was another, the personal popularity of Sir Charles Warren; each man felt he was to be 'under Warren,' and that meant a great deal to every colonist who volunteered. Not only at the Diamond Fields, but throughout the colony, this name of itself was sufficient to evoke enthusiasm; it was generally felt that the cause which had 'Warren' at its head would be worth fighting for, and would be successful."—(Mackenzie's "Austral Africa," vol. ii. p. 44.)

The following Engineers were selected to accompany him:—Lieutenant-Colonel A. G. Durnford, C.R.E.; Major Elsdale, commanding the Balloon Detachment of eleven men, to which was attached Lieutenant Troliope, Grenadier Guards, as Acting Engineer; Captain Jelf, commanding a Mounted Section of the Telegraph Battalion, which consisted of Lieutenants Anstruther and Heath, with eighty-two Non-commissioned Officers and Sappers; Captain Bagot, commanding the 7th Field Company, with Lieutenants Haynes, Salvelen, and seventy-one Non-commissioned Officers and Sappers; Captain J.C.L. Campbell, who was placed in command of a Pioneer Regiment raised locally; and Lieutenant Hussey, Adjutant.

The troops arrived at Cape Town in the month of December, 1884, and were pushed forward as quickly as possible to Langford, where railway communication ceased. From thence the advance into Bechuanaland was made. The extraordinary rapidity with which Warren carried out the objects of the campaign completely disconcerted the action of his opponents. He himself had drawn up a memorandum before leaving London, which clearly defined the purpose for which he was entering the district:—

* An account of his work in this connection will be found in Part III., Chapter V.

"The object of this mission and expedition is to remove the filibusters from Bechuanaland, to pacificate the territory, to reinstate the natives in their lands, to take such measures as may be necessary to prevent further depredations, and finally, to hold the country until its further destination is known."

The first part of this scheme was soon accomplished, and before long Warren had established his column at Mafeking. The distance of this point from Langford, where the railway terminated, is 314 miles. Much had to be done before the troops could be safely concentrated at that remote point; but Warren, aided by his Engineers, overcame all difficulties, and was able in a very short space of time to appear on the scene with such a strength at his command as completely cowed the Boer freebooters. Forts or redoubts were built at the following points on the road—Barkly, Taungs, Brussels, Vryburg, Groot Choing, and Sitlagoli, each of which was held by a suitable garrison. The water supply was a great difficulty. On this point the Commanding Royal Engineer reported—

"Where water was found it was generally in pools in a river bed, which were fenced round and protected from being fouled by cattle; generally, however, wells had to be sunk, and in all cases means for raising water had to be provided."

The telegraph line was laid as rapidly as the troops marched, and indeed was often in advance. When the camp had been formed at Mafeking the Engineers continued their arrangements for another forward movement as far as Monopolole, 120 miles north of that post, and the telegraph was carried ninety miles of this distance.*

A Balloon Corps also formed part of the Expedition, under Major Elsdale, R.E. The details of work done by this detachment will be found in Part II., Chapter IV., under the head of Ballooning.

One interesting incident may be recorded in connection with the stay of the Royal Engineers in camp at Mafeking. They built a church for the Wesleyan Mission there.

"I had not seen such bricklaying in the country. I do not think many buildings for a long time to come will excel this church at Mafeking in the excellence of the workmanship of the Royal Engineers. Colonel Durnford took special interest in this work, and was pleased to be able to render such substantial help to the people whose protection and welfare had been one of the leading objects of the Expedition." —(Mackenzie.)

The objects of the advance having been achieved, so far as

* Further details of the telegraph work in Bechuanaland will be found in Part II., Chap. III.

was deemed advisable by the Home Government, the troops were withdrawn from the district in the months of July and August. The return of Sir Charles Warren was made the occasion for a series of ovations at every point on his journey, culminating with his reception in Cape Town and only terminating at his embarkation.

"The enthusiasm of the people of Cape Town was by no means exhausted by what they had transacted; for on the day of sailing, Sir Charles Warren found himself surrounded everywhere by people pressing to bid him a sincere and grateful farewell. Several leading citizens accompanied him to the ship, and a large crowd had assembled on the quay, who raised a concluding cheer as the head of the Bechuanaland Expedition left South Africa."—(Mackenzie's "Austral Africa," vol. ii. p. 391.)

CHAPTER XXV.

The War in Afghanistan, 1878-1881.

Victoria Cross given to Trevor and Dundas in Bhootan—The Afghan War—Engineers with the Three Columns—Advance to Gandamak and Kandahar—Submission of the New Ameer—Work of the Engineers during the War—Victoria Cross to Captain Leach and Lieutenant R. Hart—Le Mesurier's Experiences—Honours granted—Renewal of the War—Advance of Roberts on Kabul—Engineer Work on the Khyber Line—The Sherpur Cantonment—Death of Dundas and Nugent—Defence of Jagdalak Kotal by Thackeray—March of Stewart's Column from Kandahar to Kabul—Battle of Maiwand—Death of Henn—Siege of Kandahar—Roberts marches to its Relief—Battle of Kandahar—Close of the War—Honours gained by Engineers—List of those who took part in the Campaign.

In the Bhootan War of 1865 the field force had been divided into two brigades, each acting independently. The right brigade, the only one to which it is proposed here to refer, was commanded by Major-General Tombs, who, advancing from Gowhatty, penetrated by the Durunghah Pass, and captured Dewan-Giri. This incident is referred to, as it led to the Victoria Cross being awarded to two Engineer officers. The reasons were recorded as follows:—

"To Major William Spottiswoode Trevor and Lieut. James Dundas, Royal (late Bengal) Engineers. For their gallant conduct at the attack on the Blockhouse at Dewan-Giri, in Bhootan, on the 30th April, 1865. Major-General Tombs, C.B., V.C., the officer in command at the time, reports that a party of the enemy, from 180 to 200 in number, had barricaded themselves in the Blockhouse in question, which they continued to defend after the rest of the position had been carried, and the main body was in retreat. The Blockhouse, which was loopholed, was the key of the enemy's position. Seeing no officer of the storming party near him, and being anxious that the place should be taken immediately, as any protracted resistance might have caused the main body of the Bhooteas to rally, the British force having been fighting in a broiling sun, on very steep and difficult ground, for upwards of three hours, the General in command ordered these two officers to show the way into the Blockhouse. They had to climb up a wall, which was 14 feet high, and then to enter a house occupied by some 200 desperate men, head foremost, through an opening not more than two feet wide between the top of the wall and the roof of the Blockhouse. Major-

General Tombs states that on speaking to the Sikh soldiers around him, and telling them in Hindoostani to swarm up the wall, none of them responded to the call until these two officers had shown them the way, when they followed with the greatest alacrity. Both of them were wounded."

There was nothing further connected with the Royal Engineers, worthy of record, in the short Bhootan campaign.

In 1878 the Ameer of Afghanistan, Shere Ali, refused to admit a British envoy into Kabul, averring that he could not guarantee his security from danger or insult. Shortly afterwards he ostentatiously received a Russian embassy, on which he showered honours and attentions. It was therefore decided by the Supreme Government of India that he should be peremptorily called on to receive a British envoy. Sir Neville Chamberlain was named for the post, and with his retinue proceeded to the northern frontier of India, whence he was to traverse the Khyber Pass into Afghanistan, with the object of entering Kabul.

As it was considered more than probable that such action on his part would be opposed by the Ameer, troops were massed on the frontier to compel compliance with the views of the Indian Government. Three corps were formed, called respectively the Peshawar Field Force, the Kuram Valley Column, and the Quetta Column.

The Peshawar Force was commanded by Lieutenant-General Sir S. J. Browne, and under him the Engineer brigade was composed as follows:—Colonel Maunsell, Commanding Royal Engineer, with Captain Lovett as his Brigade-Major. Major North, commanding the Bengal Sappers and Miners, which consisted of the following Companies:—No. 2, under Lieutenant J. C. L. Campbell; No. 3, under Captain Dove; No. 6, under Lieutenant Stafford; and No. 8, under Lieutenant H. P. Leach. Lieutenant Exham was Adjutant. Major Sim commanded the Madras Sappers and Miners, which consisted of B Company, under Lieutenant Conner; E, under Lieutenant Lindley; and K, under Captain Rawson.

The Kuram Valley Column was commanded by Major-General Roberts, R.A., his Commanding Royal Engineer was Lieutenant-Colonel Æneas Perkins, who had the 7th Company Bengal Sappers and Miners, under Lieutenant Buston, with Lieutenant Burn Murdoch as Adjutant.

The Quetta Force, when amalgamated with the Mooltan Division, was commanded by Lieutenant-General Stewart, with Major-General Biddulph at the head of the Quetta Division. Colonel Sankey was Stewart's Commanding Royal Engineer, with Captain Le Mesurier as his Brigade-Major; and Lieutenant-Colonel

Hitchens was Commanding Royal Engineer to Biddulph's division.

The Companies with the amalgamated force were as follows:—Bengal Sappers and Miners—the 4th, under Captain Haslett; the 5th, under Lieutenant Hill; the 9th, under Lieutenant Barton; and the 10th, under Captain L. F. Brown. Bombay Sappers—commanded by Lieutenant-Colonel John Hills; the 2nd, under Lieutenant G. T. Jones; the 3rd, under Lieutenant Slater; the 4th, under Lieutenant Coles; and the 5th, under Lieutenant Bethell. Lieutenant J. D. Fullerton acted as Adjutant. Lieutenant-Colonels James Browne and O. B. St. John were attached to Stewart as political officers.

A strong contingent of officers was with each of these columns as Field and Survey Engineers, in addition to those who were with the Companies of Sappers.

November 20th had been named as the last day on which a reply would be received to the ultimatum sent to the Ameer on the 2nd of that month. This date having been reached without the arrival of any communication, orders were given to advance from all three points. The Peshawar column promptly captured the fort of Alí Musjid, at the entrance of the Khyber Pass, and pushed forward to Jellalabad, and thence as far as Gandamak. The Kuram Valley force seized the Peiwar Kotal and Shutar Garden passes after a severe fight, whilst the Quetta column advanced to Kandahar. This city they occupied, and afterwards proceeded as far as the river Helmund in one direction and Khelat-i-Ghilsai in the other. The Ameer, finding himself foiled at all points, fled from Kabul, and died almost immediately afterwards, leaving his son Yakoob Khan to succeed him. Yakoob entered into negotiations with the invaders, the result of which was the treaty of Gandamak, in virtue of which a Resident on the part of the Indian Government was to be admitted into Kabul. Major Cavagnari was appointed to the post, and was received with due honour by the new Ameer. He took up his residence in the city, with a suitable escort, and the invading columns retired within the limits of the British frontier.

The work of the Engineers, during this brief but glorious campaign, had been very severe; but it did not include any brilliant military achievements, although it may be recorded that Colonel Æ. Perkins, Commanding Royal Engineer of the Kuram Valley force, placed two mountain guns in a position from which they were able to shell the enemy's camp on the Peiwar Kotal, and was otherwise so useful to General Roberts, that he was specially mentioned in that officer's despatch for his services on the occasion. The formation of roads for the advance of the columns, and the

survey of the country to which access was obtained by the occupation, were their principal duties. Thus we read in the official narrative of the campaign that Captain Leach and Lieutenant Scott were employed at the commencement of 1879 in surveying the country between Peshawar and Jellalabad, when they were able to fix numerous points on the mountain ranges, enough, it was hoped, to supply a correct basis for a map to extend as far as Kabul. Also that great part of the Kuram Valley had been accurately mapped, and numerous topographical facts, of great interest not only to geographers but to military commanders, had been ascertained. Captain Woodthorpe, R.E., was the officer in charge of these operations. He with a party of assistants accompanied General Roberts in his expedition into Khost, and produced a series of sketches accurately representing a large tract of country concerning which the Government had previously no trustworthy information.

Captain Hoskyns, R.E., in a lecture delivered at the Royal United Service Institution, speaks thus of the Engineer work in the Peshawar Field Force :—

"The C. R. Engr's. hard work now commenced" (after the entry into Jellalabad). "Road-making, posts on line of communication, bridge-building across the Kabul river, drainage works, hutting troops, and various others of minor importance, all demanded his attention. A trestle bridge of three lengths was erected in ten days across the Kabul river. A large fort near Jellalabad was put in hand. Road-making along the line of communication was systematically commenced, and this road-making before the end of the campaign assumed gigantic proportions. The most difficult portion was close to Ali Musjid, where the road had to be blasted out of the live rock for some two miles, a work that took many months to complete. . . . . A telegraph line was laid from Dakka to Gandamack, and a trestle bridge built across the Murke Kheyl Nullah. . . . ."

He gives the following sketch of Engineer work done by the Kuram column :—

"1. A line of communication from Thull to the Peiwar Kotal, crossing a river twice, to be first made practicable for camels and then for carts.

"2. The Peiwar Kotal garrison to be well housed.

"3. The zig-zag road up to the Kotal to be laid out.

"4. The old Afghan cantonment of Habib Killa made available for two regiments and one mountain battery.

"5. The fort at Kuram strengthened.

"6. Fortified posts to be built at selected spots on the road."

In the same way the Engineers of the Quetta column were able to fix a number of peaks in the neighbourhood of Quetta; they also collected much topographical information concerning the

routes leading to Kandahar, and the passes of the Khoja Amran range.

These surveys were not carried out without much danger, and the records teem with attacks made on the adventurous observers by the tribes in their vicinity. Captain Leach, R.E., gained the Victoria Cross for his gallantry on one of these occasions, which is thus recorded in the award:—

"Captain (now Major) Edward Pemberton Leach. For having in action with the Shinwarris near Maidanah, Afghanistan, on March 17th, 1879, when covering the retirement of the Survey Escort, who were carrying Lieut. Barclay, 45th Sikhs, mortally wounded, behaved with the utmost gallantry in charging, with some men of the 45th Sikhs, a very much larger number of the enemy. In this encounter Captain Leach killed two or three of the enemy himself, and he received a severe wound from an Afghan knife in the left arm. Capt. Leach's determination and gallantry in this affair, in attacking and driving back the enemy from the last position, saved the whole party from annihilation."

Lieutenant Reginald Hart, R.E., also gained the Victoria Cross during this campaign,

"for his gallant conduct in risking his own life in endeavouring to save the life of a private soldier. The Lieutenant-General Commanding the 2nd Division Peshawar Field Force reports that when on convoy duty with that force on January 31st, 1879, Lieut. Hart, of the Royal Engineers, took the initiative in running some 1,200 yards to the rescue of a wounded Sowar of the 13th Bengal Lancers, in a river bed exposed to the fire of the enemy of unknown strength from both flanks, and also from a party in the river bed. Lieut. Hart reached the wounded Sowar, drove off the enemy, and brought him under cover, with the aid of some soldiers who accompanied him on the way."

Major Le Mesurier, who acted as Brigade-Major to the Engineers in the Quetta column, published a work giving his experiences on that line of advance, under the title of "Kandahar in 1879." Some quotations from this may be of interest in illustration of work and other details connected with the Corps. The first refers to the campaigning dress adopted.

"We all have helmets, some with spikes and some without, some with leathern chin-straps, others with brass, all with hair growing promiscuously where it will, shading off from black to white. Col. Sankey has a suit of corduroy and 'Field' boots, a Paget blade with inlaid handle. I have a suit of brown cloth, and brown boots with canvas tops, a cavalry sabre, and hunting spurs. Call wears a suit of brown canvas cloth, black lace boots and black gaiter tops, and a regimental sword, while Childers is in khakee. The officers with the Sappers, again, have helmets with wadded covers, khakee blouses; but their legs and feet are fitted with different patterns of trousers, and boots of varying colours, and

Browne, whom I met yesterday at the Glo Kotul after the scrimmage, had a suit of puttoo on, and a Terai wide-awake hat. Savage wears his patrol jacket and red stripes, with puttees bound round his legs, and St. John appears in a suit of Bedford cord. The sword belts and fittings vary with the fancy of the owner, but there is no reason why some simple working suit should not be designed, and one serviceable set of arms to be worn by one and all" (pp. 46, 47).

This is his description of Kandahar :—

"Some of us went over the citadel to see what there was. . . . . The buildings were scattered about anyhow, small courtyards and large gardens and squares, magazine and arsenal, a succession of mud walls, low doors, underground passages, and filth and ordure of every description in the greatest profusion, large tanks of stagnant water, muddy ditch, and a stench pervading which made one sick. As for the fortifications, the section or profile was all right (had the works been in repair), and consisted of a ditch 25 feet wide, and generally 10 feet deep, with means of filling it with water at pleasure, then an outer wall 10 feet high and about 18 inches thick, then a *chemin des rondes* 18 feet wide, then a main parapet 20 feet high, average 15 feet thick in the centre, provided with a 6-foot wall on top, and an interior way of 30 feet clear when the houses began. The material, mud built up in layers with chopped straw, which might have stood battering guns for a length of time, in fact, some of the artillery men doubted if any impression to speak of could have been made."—(*Ibid.* pp. 69-70.)

Le Mesurier proceeds to say that the place could have easily been taken by assault, and the city cleared from one end to the other in twelve hours.

"Bisset started off to make a general report on the water supply. Childers, Maxwell, and Jerome set to work surveying. Haslett, Barton, and Hill, with their companies of Sappers, commenced knocking down partition walls, filling in *débris*, and executing works necessary for the different departments about to be located in the citadel."

Another entry on February 26th, 1879, records :—

"Foley's survey is capitally done, and gives the whole route from Khelat-i-Ghilzai here, except the first and last marches. . . . The amount of Q. M. G.'s work that is thrown upon us is astonishing, and I endeavour to keep a record of it. . . . Browne did a capital route survey from Quetta to Kandahar in pen and ink, and I sent it off to be photozincographed."—(*Ibid.* p. 133.)

One entry more may be quoted, which gives in a few words a good account of the proceedings of the Engineers :—

"St. John in political charge at head-quarters. Campbell and Rogers, of the Survey, with Gore, Heaviside, and Holditch; Savage and Dickie, with the field telegraph and signalling. The road across the Khojak commenced by Ghilzai labourers under Wells, and completed by Haslett

and his Sappers; Haslett again with Jerome in the Gwaja pass, where Sankey and his A.D.C. Childers secured so speedily such an easy passage for the heavy guns; Nicholson, who accompanied the return force by the Tal-Chotiali line through the country where Browne had gained so much credit; the Sappers, with Browne in command, and his work at the Helmund, and again in the Arghandab at the head works of the water supply; Sharpe at Kokeran; Sankey's arrangements for sheltering the troops at Kandahar; Bisset, the Field Engineer, with Olivier at work in the citadel, and Call, the Field Park Engineer, in his endless occupation and admirable method, Whiteford, with the Bombay Sappers, at work in the Bolan, and Orpen busily engaged in Katchi during the hottest season" (pp. 279-280).

Hoskyns, in the lecture before referred to, speaks thus of the Engineer work in the Quetta column :—

"On arriving at Kandahar the C.R. Engr. immediately found his hands full to overflowing—a cantonment had to be built and various works, such as water supply, drainage, road-making commenced. These works proceeded without intermission until July, when the cantonment was finished and the troops comfortably housed. In consequence of the paucity of timber at Kandahar nearly all the roofs are domed, the villages at a distance looking like beehives. The rapidity and ingenuity with which the Kandahar mason builds these domes is most remarkable. They use gypsum—a quick setting cement—and work independentlyof centering. Our head native foreman had, odd to relate, built barracks for General Nott some forty years ago. In the Bolan, too, road-making on a large scale was being pushed on, and a detailed survey of the Peshin and Kandahar districts was being completed."

In the various despatches drawn up at the conclusion of this stage of the war the following Engineers were mentioned:—Lieutenant-Colonels W. Hichens and James Browne, Major Blair, Lieutenants Leach, Peacocke, Wells, Brown, Dickie, Hill, and Barton.

As regards Lieutenant-Colonel Browne, General Biddulph wrote as follows:—

"In his intercourse with the chiefs and people the Major-General was assisted by Lieut.-Col. Browne, R.E., Political Officer. It is due to Colonel Browne to record here that his special knowledge of the people and country, which had been gained after much study, was of the greatest service to the force and to the Major-General himself, contributing materially towards the completion of the Government desire to effect a conciliatory passage through the Kakar country."

Major-General Maunsell, C.R.E. of the Peshawar Field Force, issued an order on the breaking up of his brigade, in which he says :—

"The operations in which the brigade has been employed have not

been such as to afford much opportunity for special distinction, but some of them have been arduous, and of much interest and value as experience. The rafting operations from Jallalabad to Daka deserve special mention, about 1,000 tons of stores besides men were thus sent in ten days, a work which, with the existing land transport, would have taken many weeks; an important political object was gained, and loss, or at least injury to escorts was saved. This has been a remarkable operation, and its success has been greatly due to the energy and practical experience with such work, and with the people of the country of Major Blair, R.E."

For this campaign Colonel Sankey and Lieutenant-Colonel Æneas Perkins obtained the C.B., and Lieutenant-Colonel James Browne the C.S.I.

Matters having thus apparently been satisfactorily arranged, and the invading forces being steadily retired within their lines, a sudden calamity changed the general aspect of affairs. Sir Louis Cavagnari and his whole escort (except a few men who chanced to be absent at the time from the Residency) were murdered after a desperate resistance on September 3rd, 1879. Orders were immediately issued for a new advance on Kabul and for the retention of Kandahar, to which place the troops that had retired were to return. It was decided that the movement on Kabul should be made by the Kuram column under Sir Frederick Roberts, and that on reaching that place he should make connection with the Khyber force which was under General Bright.

The Kuram column at this time had Lieutenant-Colonel Æneas Perkins as its Commanding Royal Engineer, with the 7th Company Bengal Sappers.

In the Khyber Division Lieutenant-Colonel Limond was Commanding Royal Engineer, with the 2nd, 3rd, 5th and 6th Companies of Bengal Sappers, under the command of Major Thackeray, V.C.

In the Kandahar Field Force, under Lieutenant-General Sir D. M. Stewart, Lieutenant-Colonel W. Hitchins was Commanding Royal Engineer, with Captain Larminie as his Brigade-Major. The 4th and 10th Companies Bengal Sappers were with this column, and in reserve on the line between Quetta and Sukkur were the 2nd, 3rd, 4th, and 5th Companies Bombay Sappers.

The A, C, and I Companies Madras Sappers were ordered to remove from their respective stations at Bangalore and Rangoon to join the column under Roberts, where they were to be employed on the line of communications.

General Roberts was at Simla when the news arrived, and he at once hurried to Kuram to organize his troops for the advance. The previous campaign had exhausted the transport powers of Upper India, the expenditure in camels particularly having been enormous. Crippled as he was in this most important particular

he succeeded in moving his force in an incredibly short space of time. The advanced guard of the column reached the Shutar Garden as early as September 11th, having moved forward in compliance with telegraphic instructions from Roberts. Lieutenant Nugent, R.E., was with this force, and he immediately began intrenching the position with the 23rd Pioneers. This was completed by the night of the 12th, telegraphic communication being opened with Alikhel, and the laying of a field telegraph commenced. On the 12th General Roberts arrived at Alikhel, and started his forward movement on the following day.

The column consisted of some 6,000 men, and with this strength the advance to Kabul was accomplished, the battle of Charasiab having been fought on the road, and the Sherpur cantonments outside the city reached on October 8th. Here the Royal Engineers found ample scope for their energies. The Sherpur camp was repaired as far as their limited means permitted, the Bala Hissar made fit for habitation, and sheds for horses and commissariat stores begun. It was not, however, in their power to effect much until the projected junction with the Khyber force under General Bright had been carried out. Transport difficulties had impeded the movements of this column, and it was not until November 2nd that even part of its strength could advance as far as Jagdalak. Here it was met by General Macpherson, who had been sent from Kabul to effect a junction. The new line of communication through the Khyber was now adopted, and that by the Shutar Garden, which had been most precarious, abandoned.

The Bengal Sappers, under Major Thackeray, were echeloned on this line and employed in improving roads, building forts and huts, and establishing telegraphic communication. This work was much impeded by incursions of the enemy, and the Engineers were engaged in constant conflicts to vary the monotony of their occupation.

Meanwhile much fighting had taken place around Kabul, ending in General Roberts being obliged to retire within the Sherpur cantonments on the evening of December 14th. Intrenchments were hastily commenced to strengthen the position against the overwhelming force of the enemy. The perimeter of the cantonment was over four miles, only one half of which was enclosed by a wall. A scheme had been prepared by the Engineers in November for its improvement, and this was now put in hand; the northern face was formed by the Bemaru heights, on which some towers had been constructed.

"It was now further fortified by a line of breastworks with emplacements for guns at intervals. The north-west face was defended by a ditch and breastwork of ammunition wagons, abattis, and wire entanglements. The eastern face, the weakest, was defended by detached

buildings, and Bemaru village was loopholed. Garden walls and villages dangerously near the cantonment were blown down and levelled. It was considered necessary to clear completely 800 yards all round the cantonment inclosure. The fruit trees felled made abattis, and all shelter for the enemy razed, the walls were loopholed and breastworks strengthened; strong abattis were made along the south face and the incomplete flanks; and a second line of defence within the enclosure commenced."—(Hoskyns.)

On December 23rd the enemy, who had been previously making desultory attacks on portions of the encampment, delivered their grand assault. This was successfully resisted, and a counter-attack made which resulted in the dispersion of the Afghans with considerable slaughter.

"At the same time some Engineers were sent out to blow up the towers of one of the neighbouring villages on the south front of the cantonments, a duty successfully carried out, but unfortunately with the loss of two officers, Capt. Dundas, R.E., V.C., and Lieut. Nugent, R.E., owing to an untimely explosion caused by a defective fuse."—(Official report.)

On the same day a brisk attack was made at Jagdalak Kotal on the Khyber line by the Afghans. Major Thackeray had been left in command at this post. He had under him the 2nd and 3rd Companies Bengal Sappers, with a detachment, seventy strong, of the 24th Punjab Native Infantry. The other officers present, who were all Engineers, were Lieutenant Blunt in charge of signalling, Lieutenants Dove and Randolph 3rd Company, and Lieutenants Campbell and Gorden 4th Company Bengal Sappers. Thackeray has given the following description of the attack:—

"The enemy, whose numbers could not be ascertained, succeeded in approaching to a distance of about 150 yards, and kept up a heavy fire which was replied to vigorously by the Sappers and Punjaub Infantry. The enemy's fire was chiefly directed on the east face of the fort, and particularly on the entrance gate, which was blocked with earth and planks. Sepoy Sultan Ali of the 2nd Company was killed while receiving orders from Major Thackeray. The east face of the fort was manned by the 2nd Company Sappers under Lieut. Campbell, R.E., and by the 24th P. N. I. The enemy kept well under cover behind brushwood and rocks, and received reinforcements along the ridge. They also opened a fire which threatened to be troublesome from a hill about 200 yards in front of the fort and from the higher spurs beyond, which rendered it impossible for the garrison to reply to the former without being exposed to a plunging fire from the upper spurs. . . . . At about 4 p.m. Major Thackeray was struck by an Enfield bullet in the right arm. At about this time fire was opened by the enemy from the ridge that commanded the west face of the fort at a distance of about 300 yards. This necessitated the manning of the south face, which was exposed to the enemy's fire from the high ground in front of the fort. The 3rd Company

Sappers under Lieut. Randolph, R.E., was then posted in the flank bastions. . . . . Twice or thrice, after much drumming and shouting, the enemy showed in force on the crest of the spur with the intention of assaulting, but volleys from the fort drove them back under cover. At this time the enemy were firing all round the fort except the left front, but the men being kept well in hand by Lieut. Dove, R.E., near the expected points of assault, and the light being dim the men escaped without casualties."

This continued until about 10 p.m., when the assailants retired, and the weary garrison was left in peace. In this affair three men were killed and one wounded, besides Major Thackeray himself.

In the official report of this action the strength of the Afghan attack is stated at 3,000 men, and attention is drawn to the fact that the defenders were armed only with the short range Sapper carbine. It continues—

"On the same afternoon Colonel Norman at Jagdalak Fort heard of the critical situation of Thackeray's posts, and learning that the enemy, about 2,000 or 3,000 strong, proposed to renew the attack on the following day, sent a messenger to Colonel Ball-Acton at Pezwan, asking him to co-operate in the morning in relieving the Kotal. Norman left a few men at different posts in the pass, and reached the Kotal by 10 o'clock, where he found that in the action of the previous day Major Thackeray had been very badly wounded."

From this time the Afghans seemed to withdraw from further attack, and beyond the annoyance of isolated assaults on small parties all remained quiet. Opportunity was taken of this lull to strengthen our position at all points. The Kabul basin, now held in considerable force, was strongly fortified. Fort Roberts and two detached works were constructed on the Siah Lung range. The Bala Hissar was strengthened and occupied by the Khyber brigade, forts and detached works were thrown up on the Asmai and Darwaza heights. The Sherpur cantonment was converted into a strongly intrenched camp; three bridges were thrown across the Kabul river, and all the main roads made passable for artillery. In all, as Hoskyns sums up,

"the Commanding Engineer" (Colonel Æneas Perkins) "had under his direction the following works to complete:—10 forts, 15 detached works, 3 large trestle bridges, numerous small ones, 4,000 yards of defence, 45 miles of road, 2 posts, also quarters for 8,000 men."

On the Khyber line the most important work was the construction of the road through the Jagdalak range. This was carried out under the superintendence of Major Blair, R.E., and cost about £300 per mile.

In Southern Afghanistan there had been no fighting. The

troops under Stewart had advanced and occupied Khelat-i-Ghilsai and other points. Kandahar was made the central position, and the Engineers were principally occupied on the communications. Their chief work was the Sukkur-Sibi railway. On this line no less than 133 miles were laid in 126 days.

"Certainly the country was a dead flat, but the Chief Engineer had to contend in a minor degree with the same difficulties that M. de Lesseps encountered in the Suez Canal; he had to provide food, shelter, and water for the labourers who were imported from South India."—(Hoskyns.)

Orders had been issued to replace the Bengal Division at Kandahar with one from Bombay, so that the former should march viâ Ghuznee to Kabul under General Stewart, who, on arrival at the latter point, was to assume command of the entire Kabul force. The Bombay Division, under General Primrose, which included the 2nd, 3rd, 4th, and 5th Companies of Sappers, having arrived, the Bengal troops under Stewart commenced their march to Kabul. The 4th and 10th Companies Bengal Sappers formed part of the strength. On arriving near Ghuznee a severe action was fought on April 19th at Ahmad Khel, in which the Afghans were defeated with great loss. This was followed by the occupation of the fortress, where the column remained for three days, after which it continued its march, and effected a junction with the Kabul corps. Captain Larminie was Commanding Royal Engineer with this division on its march, the other Engineer officers being Captains Call, L. F. Brown, Hoskyns (orderly officer to Brigadier-General Palliser), and Haslett, Lieutenants Goré, Martin, and Jerome.

After the departure of the Bengal Division matters remained quiescent in Southern Afghanistan for some time. There were, however, signs that disturbances might shortly be expected on the side of Herat. In June Major Leach, R.E., was sent to Maiwand to ascertain its capabilities as a standing camp. He reported that strategically it was an admirable position, as it commanded the roads from the north and west. It was also well supplied and water was abundant. It will not fall within the province of this work to detail the various movements of the force which was sent northward from Kandahar under Major-General Burrows for the purpose of checking the advance of an army assembled at Herat by Ayoub Khan, and known to be moving against either Kandahar or Khelat-i-Ghilsai. With the troops under Burrows was a party of about forty of the 2nd Company Bombay Sappers, under the command of Lieutenant T. Rice Henn, who had but recently been appointed Acting Brigade-Major to the Engineers in the Kandahar Field force. Lieutenant-

Colonel St. John, Political Officer, and Major Leach were also with Burrows; the latter acted as his orderly officer during the battle of Maiwand, and in that capacity conveyed the order for the advance of the cavalry. His horse was wounded under him. It is only with the circumstances attending the fate of Lieutenant Henn at this fatal field that it is proposed to deal. A week before that date Henn had written a letter dated at Kushk-i-Nakhud, July 20th. This place lies about ten miles south-west of Maiwand, and the British column was at the time concentrated there.

"I left Kandahar with forty Sappers on July 4th, with the Horse Artillery and Cavalry for Girishk. . . . . We had some long and weary marches, and the heat was something frightful—112° in our tents."

He then narrates the mutiny of the Wali's troops, and continues—

"It was decided by the General to send a force to intercept them . . . . About ten o'clock we crossed the Helmund and went after them. I and my Sappers in front of the horse artillery, for whom I had to clear a road in places. . . . . Our artillery was at this time delayed by a difficult canal. I managed, however, in a short time to make a passage for them, and they were soon in action. After this the affair was soon over. . . . The enemy lost nearly 100 killed, and I should say double that number wounded. We took back the captured guns with us to camp that night, and had a hard job of it, not getting in till past eight o'clock. We were all very pleased at having had a bit of a fight. As supplies were beginning to get scarce at Girishk and there was no object in remaining there to support the Wali, who had now no army and was a refugee in our camp, we moved back here on the 15th, half way between Kandahar and Girishk so as to stop Ayub Khan's advance. We hear to-day that he is forty miles off, with 12,000 men and 36 guns. We have 2,400 men and 6 guns, but we shall have little difficulty in giving a good account of him if he ventures to fight. I have been very busy yesterday and to-day putting the camp in a state of defence, and as I am the only R.E. with the force I do not get much rest."

General Burrows heard on the afternoon of the 26th that part of Ayoub Khan's army had occupied Maiwand, but he was without information as to its strength. He determined, therefore, to advance early on the following morning and endeavour to reach Maiwand before the main portion of the enemy's troops could reinforce their leading column. The march lasted with some halts for about five hours, and it was nearly noon when the vicinity of Maiwand was reached. There was much mirage on the plain, and it was very difficult to discern either the strength or the dispositions of the enemy. Captain Leach, R.E., has recorded in

much detail the proceedings of this day. After describing the ground in front of the village of Mundabad he proceeds:—

"Had we desired to remain on the defensive we occupied a strong position. The village in question would have afforded cover for our infantry, and there was abundance of water. But acting under the impression that the enemy had no guns, and that their force, whatever its strength, might very possibly retire without showing fight, General Burrows decided to attack, and a general advance was ordered across the ravine. . . . . Our line had advanced to within about 3,000 yards of the enemy in the following formation: Cavalry on the extreme left; Bombay Grenadiers on the left of the infantry line, and the 60th on the right. Six Companies of Jacob's Rifles in support with the small detachment of Sappers and Miners."

The battle then commenced, and shortly the supports, viz., Jacob's Rifles and the Sappers, were brought into the fighting line. A large body of Ghazis advanced against the right, and were met by the 66th with a withering fire. After coming to within 500 yards they sought the shelter of a small watercourse and remained stationary.

The affair now became an artillery duel, which lasted for upwards of two hours. The Afghan guns were well served, and our losses consequently very severe. Our troops were also suffering extremely from want of water, and this told heavily against the discipline of the Sepoys, already much shaken by the artillery fire. At length some of our guns, which only had 60 rounds with them, had expended the whole and were ordered to retire. This was followed by an immediate advance of the enemy's front, and their artillery now took up a position within 800 yards of our line:—

"At 2.30 our infantry on the left, without any tangible reason, showed signs of wavering, and the two companies of Jacob's Rifles fell back. Both English officers had been killed, and also two native officers. . . . . The men were cowed by the artillery fire and the want of water. Their officers killed, discipline vanished, and no effort on the part of officers in rear could stop the movement. Unsteadied by the Rifles the Grenadier Regiment, which up to this time had been doing well, and had twice successfully checked the enemy's advance, was the next to give way. The remaining companies of Jacob's Rifles followed suit, and for a moment the guns with the little detachment of Bombay Sappers were left entirely unprotected. Of the conduct of the latter, under poor Henn, of the Engineers, one of the killed, too much can hardly be said."

This defection of the left portion of the line was immediately followed by a rush of the Ghazis, who surrounded the infantry that had up to this point stood firm, but who now gave way. An unsuccessful attempt was made to cover the retreat by a charge of

cavalry, but these had become as much demoralized as the infantry, and could not be made to act with vigour. The charge consequently failed, and the troopers retired in disorder. All was now in hopeless confusion. The 66th fought stubbornly and lost very heavily, especially in officers, but they were borne along in the throng.

"The infantry, meantime, hemmed in by the Ghazis on all sides, made straight for the enclosed cultivation and low walls of the village of Mundabad, separated by an interval of several hundred yards from the cavalry and guns."

It now remains to tell what became of Henn and his little detachment of Sappers, already much thinned by the protracted artillery fire. General Primrose, in his despatch of October 1st, says:—

"I have it on the authority of a Colonel of Artillery of Ayoub Khan's army, who was present at the time, that a party of the 66th Regiment, which he estimated at 100 officers and men, made a most determined stand in the garden. . . . They were surrounded by the whole Afghan army, and fought until only eleven men were left, inflicting enormous loss upon the enemy. These eleven charged out of the garden and died with their faces to the foe, fighting to the death. Such was the nature of their charge and the grandeur of their bearing, that although the whole of the Ghazis were assembled around them not one dared approach to cut them down. Thus standing in the open, back to back, firing steadily and truly, every shot telling, surrounded by thousands, these eleven officers and men died, and it was not until the last man had been shot down that the Ghazis dared advance upon them."

Such was the report of one of the enemy, and in its main incidents it seems to have been true. Very shortly afterwards the scene of the battle was visited, and on the spot where this noble incident occurred there were found, lightly buried by the Afghans, forty-six men of the 66th Regiment, twenty-three of the Grenadiers, and fourteen Sappers, with Lieutenant Henn. This was the body which made the last stand, and the only officer with it was Henn. Primrose, in his despatch, continues:—

"With the gallant band who made the last grand effort, fought and died Major Blackwood, R.A., T. R. Henn, R.E., and C. W. Hinde, 1st Bombay Grenadiers."

It is very clear that no officer of the 66th Regiment was present at this time. That gallant corps had suffered fearfully both in officers and men; but it is possible to trace the fall of each of the former, and thereby to prove that none of them took part in the last stand, although they had died quite as nobly, fighting to the bitter end to save the colours of their regiment. There were ten

officers of the 66th killed in the engagement, and General Primrose thus describes their fall:—

"Lieut.-Col. James Galbraith was seen on the Nullah bank kneeling on one knee, with a colour in his hand, officers and men rallying round him, and on this spot his body was found. Here, too, fell Capt. W. H. McMath. . . . . close by 2nd Lieut. H. J. Barr. Capt. E. S. Garrett and F. J. Cullen were both killed in the field in front of the Nullah. . . . . Capt. W. Roberts was mortally wounded in the garden . . . . . and here also fell Lieut. M. E. Rayner, Lieut. R. T. Chute, 2nd Lieut. W. R. Olivey, and 2nd Lieut. A. Honeywood."

It is therefore impossible that either of these officers could have been amongst that last heroic band, who, when all had been shot down except themselves, charged out of the garden, and died in the open, back to back, fighting steadily and truly, every shot telling. Two other officers besides Henn were named as being present—Major Blackwood, R.A., and Lieutenant C. W. Hinde, 1st Bombay Grenadiers. As regards the former, he had been dangerously wounded in the thigh early in the action, and had been laid in the garden, whence it was a physical impossibility that he could have joined in the charge. Lieutenant Hinde's body was not found in the place where the last stand was made; whereas that of Henn was buried, as we have seen, in the midst of the gallant group on the spot where they fell.

Everything proves that he and some of his Sappers formed part, if not the whole, of that heroic little band, and that they died voluntarily to cover the retreat of the broken column. Twice within less than two years had an officer of Engineers made this noble sacrifice. As we have seen in the last chapter, Anthony Durnford performed a similar feat on the fatal field of Isandlwana; now for the second time it is carried through by another Engineer. Is it to be wondered at that the Corps loves to pour its grateful tribute of praise on these two gallant spirits who were indeed found "Faithful unto Death?" Henn and Durnford were both men of the same type, so far as the elements of self-sacrifice and contempt of death are concerned, and their memory will never fade from the hearts of their comrades. In both cases it must be remembered that they could easily have saved their lives without the shadow of dishonour. Lieutenant-Colonel Hills wrote on this point as regards Henn:—

"On the battle field of Maiwand he and his Sappers were posted alongside the battery of Horse Artillery, and I am glad to say that they were the last of all the troops to leave the line of battle. Capt. Slade, commanding the Horse Artillery, told Henn he was going to limber up, and when he started off he says Henn made his men stand up and fire

a volley into the crowd of Ghazis. . . . . He had been wounded in the arm sometime before this, but remained with his men to the last."

Let it therefore never be forgotten how Henn and his Sappers, the last to leave the line of battle, made a final stand to cover the retreat, and died at their post the fear and admiration of the enemy.

On the receipt at Kandahar of the news of the disaster, the troops were called in from their cantonments and preparations begun to sustain a siege. A force had been sent out to cover the retreat and assist the fugitive column. This was skilfully effected by Major-General Brooke, and eventually the shattered remnants of the force were brought in. Major Leach, V.C., R.E., was one of those specially mentioned "for their untiring exertions during this harassing march."

Instructions were given to the Commanding Royal Engineer, Lieutenant-Colonel Hills, to close up the gates, and destroy all houses abutting on the walls. The available Engineer strength within the city, under Hills, consisted of Major Leach, V.C., Brigade-Major in place of Henn; Captain Cruickshank, Lieutenants E. Waller and Jones, five Non-commissioned Officers, and forty rank and file of the 2nd Company Bombay Sappers, but materials and tools were very deficient, as most of the Engineer equipment had been abandoned when the troops were called in from the cantonment. They were consequently compelled to depend on what they could obtain from the Ordnance Depôt and regimental stores. They had, in addition, a small quantity of gun-cotton without detonators, and a few barrels of blasting powder. The following extracts from the report of the Commanding Royal Engineer show the kind of work that was done:—

"There was an immensity to do before the walls could be placed in a proper state of defence . . . the whole of the demolitions outside the city were completed without the use of powder . . . and in ten days from the commencement of the siege, there was little fear of a successful attack. . . . . Had any means existed of procuring electric light, all fears of a night attack would have been set at rest, although 400 scaling ladders were afterwards found in Ayoub's camp. . . . . All the gates were protected by abattis . . . . upwards of 30,000 sand bags (principally Commissariat flour bags) were used, and with the wire entanglements outside the walls are said to have occasioned fears of hidden mines in the minds of the Ghazis. The 2nd Company of Sappers was by the end of the siege reduced to less than twenty effectives, the detachments present at Maiwand and Deh Khoja having on both occasions lost more than half their strength in killed and wounded."

The Deh Khoja losses here referred to occurred on the occasion

of a sortie undertaken by Major-General Brooke, on August 16th, against the village of that name. Captain Cruickshank, R.E., was killed, General Brooke himself carrying him out of the village. A few moments later General Brooke was also killed.

Previous to this, on August 12th, a party had been sent out to demolish some walls which were being used as cover by the enemy. On this occasion it is recorded in the official account that Lieutenants Waller and Jones, R.E., gallantly brought in a wounded man of the 19th Native Infantry under heavy fire. They were both recommended for the Victoria Cross by General Brooke, and would doubtless have received it had not that gallant officer, who was an eye-witness of the deed, been killed at Deh Khoja four days afterwards.

As soon as the news of the disaster of Mainwand reached Kabul, General Stewart ordered Major-General Roberts to proceed immediately to the relief of Kandahar at the head of a picked force. On August 8th Roberts started from Kabul on his memorable march, the following Engineers accompanying the column :—Lieutenant-Colonel Æneas Perkins, C.R.E., Captains Brackenbury, Call, Nicholson, Spratt (who acted as Deputy Assistant Quartermaster-General), and Tickell ; Lieutenants Glennie, the Hon. M. G .Talbot, Longe, Cather, Childers, and Onslow. The troops numbered 10,000 men, with 18 mountain guns, and 8,000 followers. Ghuznee was reached in seven days, being a distance of ninety-eight miles ; Khelat-i-Ghilzai, 136 miles farther, took another eight days to accomplish ; and Kandahar, eighty miles from Khelat-i-Ghilzai, was reached on the morning of August 31st, the whole distance of 321 miles being thus accomplished in twenty-three days.

The battle of Kandahar followed, when the troops of Ayoub Khan were totally defeated and dispersed. The war was now practically over. The new Ameer Abdul Rahman was established at Kabul, and the British troops withdrawn within the Indian frontier. Some expeditions were carried on to quell disturbances in neighbouring districts before the retirement was finally accomplished, and it was not until the middle of 1881 that Afghanistan was finally evacuated.

In the rewards that were given at the close of the second part of the war, the following Royal Engineers participated :—

To be Companions of the Bath—Colonel David Limond, Lieutenant-Colonel W. Hichens, Lieutenant-Colonel J. Hills. To be Companion of the Star of India—Major O. B. St. John.

To be Lieutenant-Colonels—Majors G. S. Hills, R. Thompson, W. North, R. G. Woodthorpe, E. P. Leach, V.C.

To be Majors—Captains W. J. Heaviside, C. Strahan, E. Harvey,

M. W. Rogers, E. M. Larminie, T. H. Holditch, W. S. Bisset, W. G. Nicholson, C. F. Call, and L. F. Brown.

The Engineers who took part in the war and received the medal with clasps for the various actions at which they were present were more numerous than in any previous campaign. The list is as follows:—

Major-General Sir M. K. Kennedy who was Controller-General of Transport and Supply to all the columns; Major-General F. R. Maunsell; Colonels R. H. Sankey, R. de Bourbel, D. Limond, W. Hichens, Æ. Perkins, J. Bonus; Lieutenant-Colonels J. Hills, J. G. Lindsay, E. T. Thackeray, G. S. Hills, G. E. Sanford, T. F. Dowden, W. B. Holmes, F. Blair, R. Thompson, O. B. C. St. John (employed as a Political Officer), C. A. Sim, W. M. Campbell, James Browne (also employed as a Political Officer), B. Lovett, W. North, H. G. Woodthorpe, E. P. Leach; Majors C. R. Judge, A. Le Mesurier, S. C. Clarke, E. N. Peters, M. J. Macartney, E. D. Twemlow, K. A. Jopp, W. J. Heaviside, R. P. Tickell, M. A. Alves, C. Strahan, S. W. Jenner, E. Harvey, A. Hill, W. A. Wallace, B. Blood, M. W. Rogers, E. M. Larminie, T. H. Holditch, W. S. Bisset, W. G. Nicholson, C. F. Call, L. F. Brown; Captains G. F. Boughey, J. L. McPherson, J. T. Wright, R. R. Pulford, M. C. Brackenbury, S. L. Jacob, C. H. Kensington, W. H. Haydon, G. M. Cruickshank, R. F. Moore, G. Henry, C. H. Bagot, G. W. Bartram, W. W. Whiteford, C. C. Rawson, A. R. Dorward, C. F. Fuller, H. A. Yorke, H. Dove, R. C. Hart, V. C., H. O. Selby, F. T. Spratt, W. W. Robinson, W. Peacocke, R. T. Orpen, G. R. R. Savage, P. Haslett, J. W. Thurburn, C. Hoskyns, T. Beauclerk, St. G. C. Goré, R. H. Brown, D. A. Scott, M. Martin, C. B. Henderson, L. Langley, and J. Dundas; Lieutenants F. B. D'Aguilar, W. T. Shone, W. H. White, J. M. T. Badgley, H. W. Duperier, H. L. Wells, E. Raban, B. Scott, S. Grant, S. H. Exham, E. Glennie, H. P. Leach, W. H. Chipendall, A. C. Bruce, J. H. C. Harrison, T. P. Cather, H. D. Olivier, E. S. Hill, H. W. Smith, W. G. Bowyer, J. C. Addison, J. C. Campbell, G. Davidson, G. H. O'Sullivan, E. Blunt, R. C. Hamilton, J. Burn-Murdoch, J.B. Sharpe, T. Digby, M. C. Barton, R. C. Maxwell, A. C. Foley, J. Neville, C. L. Young, R. Jennings, C. H. Darling, P. T. Buston, G. H. Sim, H. Finnis, J. A. Ferrier, J. D. Fullerton, E. C. Spilsbury, G. T. Jones, W. D. Conner, R. V. Phillpotts, W. D. Lindley, E. H. Bethell, F. W. Attree, Hon. M. G. Talbot, A. L. Mein, S. A. Hickson, G. C. Onslow, W. F. Stafford, E. A. Waller, A. H. Kenney, R. A. Wahab, W. A. St. Clair, E. S. Childers, C. Maxwell, W. Coles, G. E. Shute, J. G. Day, G. M. Porter, A. E. Dobson, H. W. Jerome, G. K. Scott-Moncrieff, F. Peel, A. C. Macdonnell, A. H. Mason,

J. E. Dickie, H. E. Abbott, H. H. Barnet, C. B. Mayne, H. E. Goodwyn, A. J. Kater, A. H. Randolph, L. C. Jackson, F. B. Longe, G. H. B. Gordon, E. C. Stanton, J. Kellie, A. R. Ancrum, T. R. Henn, C. Nugent, B. Poulter, and J. T. Rice.

Of these Captain Cruickshank and Lieutenant Henn were killed in action, Captain Dundas and Lieutenant Nugent were killed by an explosion, and Lieutenants Dobson, Poulter, and Rice died from exposure.

CHAPTER XXVI.

The War in Egypt, 1882-1885.

Engineer Staff in the Army of 1882—Murder of Captain Gill in the Desert—Battle of Kassassin—Assault of the Lines of Tel-el-Kebir—Close of the War—Expedition to Suakin under Graham in 1884—Battle of El Teb and Relief of Tokar—Battle of Tamai—General Gordon at Kartoum—Expedition for his Relief—The Nile Voyage—The Desert March—Wilson's Expedition to Khartoum—The Voyage from Korti to Hamdab—Second Expeditionary Force to Suakin—Volunteer Engineers with the 10th Company—Disaster at El Tofrek—Conclusion of the War—Engineer's Rewards—War in Upper Burma—Capture of Mandalay—Alterations in the Corps since 1854.

The war which broke out in Egypt in 1882, led before its termination to the sacrifice of one of the noblest spirits ever enrolled in the ranks of the Engineers. The death of Charles George Gordon, at Khartoum, forms a fitting climax to the military history of the Corps. It remains in this, the last Chapter of that history, to trace the share which the Engineers bore in the various stages of that struggle.

When Sir Garnet Wolseley was appointed in the summer of 1882 to command an army for active service in Egypt, the following Engineers were selected to join him:—Major-General Graham, to command the 2nd Brigade of the 1st Division; Colonel C. Nugent, to be Commanding Royal Engineer, with the rank of Brigadier-General; Colonel Harrison, to be Assistant Adjutant-General to the Chief of the Staff; Lieutenant Childers, A.D.C. to Sir Garnet Wolseley; Major Hart, A.D.C. to General Graham; Major Fraser, to be Brigade-Major; and Captain S. Waller, A.D.C. to Brigadier-General Nugent; Lieutenant-Colonel H. H. Jones, Major Ardagh, Captain Gill, Captain G. S. Clarke, and Lieutenant Caillard, all for special service, and the following officers and men, with the Troops and Companies:—

1st Division.—Colonel J. Drake, C.R.E., with Captain G. Barker as Adjutant, having under him the 24th Field Company, commanded by Captain C. Carey; the other officers being Captain Dorward, Lieutenants Hellard, J. Campbell, and J. C. Tyler.

2nd Division.—Lieutenant-Colonel J. Maitland, C.R.E., with Captain A. Green as Adjutant, having under him the 26th Field Company, commanded by Major Blood; the other officers being Captain Dickinson, Lieutenants Blackburn, Pollen, and Tuke.

The Engineers attached to the army as Corps Troops were the A or Pontoon Troop, commanded by Major Bond, the other officers being Lieutenants R. da C. Porter, Godsal, Pemberton, Irvine, and Sandbach; and the C or Telegraph Troop, commanded by Major Sir A. Mackworth, the other officers being Captain Whitmore, Lieutenants Hippisley, Foster, Bond, and Anstruther. The Field Park was under Captain Rochfort Boyd; the Railway Staff consisted of Major Wallace, Captain Scott, and Lieutenant Willock; and the 8th Railway Company under Captain Sidney Smith, the other officers being Lieutenants Vidal, Dopping-Hepenstal, and Hulcatt; the 17th Company under Captain Hyslop, the other officers being Lieutenants Heath and A. Thomson; and the 18th Company under Major Salmond, with Captain Gordon, Lieutenants Mantell, Norris, and Winn.

These various Troops and Companies left England for Egypt in the months of July and August, 1882.*

They were shortly after reinforced by the following additional officers and men:—

Major-General Wray, to be second in command at Alexandria; Lieutenant-Colonel Webber, A.Q.M.G. for Telegraphy; Captains Watson and Conder for special service; Colonel C. Warren and Lieutenants Burton and Haynes to be attached for duty under Admiral Sir Beauchamp Seymour; Lieutenant-Colonel

* During the passage out, Lieutenant R. da C. Porter was accidentally killed by the fall of a spar on board ship in the Bay of Biscay. He was the only son of the writer, who may be pardoned for here quoting an extract from the Obituary Notice which appeared in the "Royal Engineer Journal" for October, 1882:—"Lieutenant Porter was a very promising officer. . . . Last year he was awarded the gold medal of the Royal Engineers' Institute for the Prize Essay, written with great ability, on 'Warfare against Uncivilized Races; or, How to Fight greatly Superior Forces of an Uncivilized and Badly-Armed Enemy;" his service in the campaign in South Africa enabling him to support his opinions by the practical experience he had there acquired. . . . He was sent out to Natal in December, 1878, with the 5th Field Company, R.E., to join the Zulu Expeditionary Force, and served with Brigadier-General Glyn's column, and afterwards with Sir Evelyn Wood's flying column. After the conclusion of the war he went with his Company to Cape Town, and studied for the Staff College, and in the examination of 1880, while still at the Cape, he passed in first, having obtained 2,721 marks, the largest obtained by any officer who passed first at any of the examinations since 1872, the first at which officers of Royal Engineers competed." Captain H. B. Rich was appointed to the vacancy in the A Troop caused by his death.

Sir C. Wilson and Major Chermside in a similar position under Sir E. Malet; Captain Gracey and Lieutenant Bennet to the Railway Corps; Lieutenant Leverson to the Commissariat Department; and the 21st Company under Captain Puzey, the other officers being Lieutenants Elrington and Cleeve.

An Indian Contingent was also added to the army, the Engineer branch of which consisted of the following officers:—Colonel J. Browne, C.R.E., with Lieutenant Cather as Adjutant; Majors A. Hamilton, Armstrong, and W. Nicholson, Lieutenants Burn-Murdoch, Darling, Andrews-Speed, Baldwin, Lindley, Mason, Dickie, and Goodwyn, with the A and I Companies of Madras Sappers.

One of the first incidents of the campaign was the murder of Captain Gill, Professor Palmer, and Lieutenant Charrington, R.N., in the desert. The circumstances attending Gill's appointment, and those which led to his taking part with Professor Palmer in this journey, were thus narrated by Lord Northbrook, then First Lord of the Admiralty, at a meeting of the Royal Geographical Society, in November, 1882:—

"In the meantime hostilities had broken out, and the moment that occurred I sent for Captain Gill and asked him if he would like to go to Admiral Hoskins, who was in command of the ships, to assist in the Intelligence Department. Capt. Gill, with that high spirit which was so well known, at once joyfully accepted the employment, and arrived at Suez a day or two after Professor Palmer. It must be understood that this was after hostilities had commenced but before the British troops had arrived at Alexandria, and before the Indian troops had arrived at Suez. Arabi had been receiving information by means of the telegraph which passed through Constantinople, crossing the Canal at Kantara, and going thence to Cairo. It was important to cut that to prevent Arabi having notice of the movements of our troops. Admiral Hoskins entrusted that duty to Capt. Gill, and Captain Gill went from Ismailia to Suez. He there found Professor Palmer, and with a very gallant officer, Lieutenant Charrington, they went into the desert, Capt. Gill with the intention of proceeding northwards to cut the telegraph wire, Professor Palmer and Lieut. Charrington intending to go to Nakhl to meet one of the Sheikhs and purchase camels. A few days after they started they met with their sad fate. That is the simple story of their employment in Egypt. The work which Capt. Gill undertook was one of great danger. To cross the desert, and to cut the telegraph at that time was a very dangerous enterprise, and I believe that Capt. Gill was well aware of the danger when he undertook it. I do not wish to dwell on this sad story, but we must all feel that these three men well represented the spirit of the country. There was a man like Professor Palmer sacrificing all his learning to the service of his country. Capt. Gill, a scientific soldier of considerable fortune of his own, ready to

go out at once upon any enterprise which could be of use to his country; and the gallant young sailor going with them in a spirit well worthy of the distinguished officer whose Flag Lieutenant he was."

The actual details of the catastrophe were as follows:—They left Suez on August 8th, and the Well of Moses the next day. Rumours soon began to circulate that some mishap had occurred. The Admiralty became alarmed, and Colonel (now Sir Charles) Warren, R.E., whose experience and qualifications for dealing with an inquiry among natives were highly esteemed, was sent out at the end of the month to advise and assist Admiral Hewitt. Warren at once proceeded on the search, but it was not until October 20th that he could report their having been murdered on August 10th.

In an article on Captain Gill, which appeared in the "Times" of November 2nd, 1882, the following passages occur:—

"It will be no easy matter to replace him in the Intelligence Department, where he had been employed for the last six years, and for the duties of which he possessed special qualifications. Owing to the confidential nature of the work on which he was employed it is not possible that the great value of the information he has at various times and at great risks collected can ever be known to the public, but it has been fully appreciated by those for whom he worked so zealously." . . . . .

"Not only will his untimely death be grievously felt by his many personal friends, but the State has lost in him an experienced, able, and trusted servant, whose services could ill be spared at any time, but the loss of which will be particularly felt during the present unsettled state of affairs in the East."

On the arrival of Sir Garnet Wolseley at Alexandria, on August 15th, he took steps for the immediate transport of the troops from that station to Port Said, and thence through the Suez Canal to Ismailia. This was accomplished so quickly that the enemy were taken completely by surprise, and Ismailia occupied without resistance on the evening of August 20th. As soon as the troops had disembarked, Major-General Graham, with a portion of his brigade, was pushed to the front, and by August 26th had reached Kassassin Lock on the fresh water canal. At this point he was attacked in force on the 28th. He had then with him two battalions of the line, some Mounted Infantry, and four guns. Four miles in rear of him, at Mahsameh, Major-General Drury Lowe was encamped with the Household Cavalry and the 7th Dragoon Guards. Although greatly outnumbered Graham held his ground, and succeeded in checking all attempts of the enemy to dislodge him until the arrival of the heavy cavalry from Mahsameh, when he was able to assume the offensive. He then ordered a charge of the whole of Drury Lowe's

force, which had with it four guns of Horse Artillery. By this brilliant movement he succeeded in driving the enemy from their position, riding through their guns, scattering their infantry, and inflicting a very severe loss. The result was that the Egyptian army, which had been led by Arabi Pasha in person, fell back on its original position, five miles in front of Kassassin.

This was the first action in the campaign. The troops were under the command of an Engineer General, and the post they occupied an extremely exposed and critical one. That they held their ground so successfully till reinforced, and that then the enemy received such a severe lesson, was a proof of the skilful handling of his brigade by Graham.

The main portion of the army was soon after advanced to Kassassin, and preparations made for an assault on the Egyptian position at Tel-el-Kebir. Owing to transport difficulties this took some time to complete, and meanwhile Graham was once more attacked in his forward position. The second attempt was not more successful than the first, and the Egyptians again retired within their lines, which by this time had been greatly developed and strengthened.

On the night of September 12th Wolseley made his celebrated march across the desert. The Engineer operations in connection with this advance, involving telegraph, railway, and pontooning work, are all fully detailed in Chapters II. and III., Part II., under the heading of Royal Engineer Troops, and Companies. The only other portion which requires to be alluded to is the share taken in the assault by the brigade commanded by Graham. In the official account of the battle the movements of that brigade are given in much detail, and from it the following extracts are taken:—

" . . . . A long line of rifle fire suddenly breaking out from intrenchments lying still in the obscurity of the western horizon, and the rapid flashes of artillery from the redoubts made manifest that all chance of effecting the surprise of the enemy's position on his left was gone. . . . . At a distance of 600 yards from the works, the fire of the enemy having become very heavy, and its effect making itself rapidly more apparent, the advance in line was changed to attack formation, and the assault pushed home to the works. The light had now much increased, but the heavy fire maintained by the enemy had covered the ground in front of his lines with a dense cloud of rifle smoke, which, drifting slowly before the light westerly breeze, had hidden the advancing lines of the 2nd Brigade, and enabled them to reach the edge of the trenches with a loss, small when compared to the volume and rapidity of the fire directed against them. . . . . The General Officer commanding the brigade" (Graham) "speaks in his report

of the advance of the three battalions over the parapet having taken place nearly simultaneously, and there can be no doubt that although the battalion on the extreme right (the Royal Irish) appeared to have been the first to have gained the intrenchments, the rest of the Brigade was in possession of the works along 1,000 yards of front within four minutes from the time the first man had passed the parapet."

With reference to this assault as well as to the previous actions at Kassassin, Sir Garnet Wolseley wrote in his despatch of September 24th, 1882 :—

"The brunt of the fighting throughout the campaign fell to the lot of Major-General G. Graham, V.C., C.B., commanding 2nd Brigade, and it could not have been in better hands. To that coolness and gallantry in action for which he has always been well known, he adds the power of leading and commanding others."

In the same despatch Sir Garnet named many other Engineers. As regards one of them he added :—

"Major Ardagh did excellent service as an Engineer officer at Alexandria previous to my arrival. In addition to his regular duties he rendered valuable assistance in the organization of our railway system from Ismailia to Kassassin. Always willing to undertake any service, no matter how difficult or trying, he has proved himself to be a most excellent officer in the field, and I have the utmost pleasure in recommending him for promotion."

The victory of Tel-el-Kebir closed the war. The Egyptian army utterly collapsed, and the rapid advance of the British cavalry to Cairo completed its disorganization. No resistance was offered at any point, and on the arrival of Sir Drury Lowe at Cairo the citadel was surrendered.

The garrison appointed for its occupation consisted of two Squadrons of the 4th Dragoon Guards and some Mounted Infantry, the whole being placed under the command of Captain Watson, R.E.

The entire force gradually concentrated at Cairo, and after a review at which the Khedive was present, the major portion embarked at Alexandria for England, so that by the end of October the army of occupation alone was left. The Engineers that remained were—Major-General Graham, commanding a Brigade; Lieutenant-Colonel Ardagh as Deputy Assistant Adjutant and Quarter-master General; Lieutenant-Colonel Maitland, C.R.E., with Captain Green as Adjutant; the 26th Field Company under Lieutenant-Colonel Blood, with Captain Dorward, Lieutenants Blackburn, Mantell, and Tuke; the 17th Company under Major Wood, with Lieutenants Heath and Thomson; and the 21st Company under Major Puzey, with

Lieutenants Elrington and Cleeve; Lieutenant-Colonels Sir C. Wilson and Warren, Major Chermside, Lieutenants Burton and Hayes were also attached for special duty.

The rewards granted to the Royal Engineers for their services in this short but brilliant campaign were as follows:—

Major-General G. Graham and Colonel C. Nugent to be K.C.B.; Colonels James Browne and Drake, Lieutenant-Colonels J. Maitland and C. Webber to be C.B.; Colonel Richard Harrison to be C.M.G.

The following promotions were also given:—

Majors Ardagh, Hamilton, Fraser, Bond, Blood, Wallace, Armstrong, Sir A. Mackworth, and R. Hart to be Lieutenant-Colonels.

Captains Carey, Wood, S. Waller, Puzey, Watson, Barker, S. Smith, Scott, and Rochfort Boyd to be Majors.

The Khedive also bestowed the Orders of the Medjidie and Osmanieh as under:—

2nd Class, Medjidie—Major-General Graham, Brigadier-General Nugent. 3rd Class—Lieutenant-Colonels Maitland, Webber, Jones; Majors Bond and Sir A. Mackworth. 4th Class—Captains S. Waller, Barker, Green, Conder, Watson, and Wood. 5th Class—Lieutenants Childers, Caillard, Dickie, Burn-Murdoch, and Darling.

3rd Class Osmanieh—Colonels Harrison, J. Browne, and Drake. 4th Class—Majors Fraser, R. Hart, Ardagh, Nicholson, Wallace, Salmond, and Blood.

The year 1884 opened under great difficulties for the army of occupation in Egypt. The Mahdi had appeared in the Soudan, and his power was being felt at many points. Especially was this the case on the Eastern Littoral, where the native garrison of Tokar had been for some time besieged by an Arab force under Osman Digma. Suakin itself was also threatened from the same quarter. It was therefore determined to despatch an expedition from Cairo with the double object of relieving Tokar if not too late, and also of crushing the tribes assembled in the vicinity of Suakin.

Major-General Graham, R.E., whose brilliant services in the campaign of 1882 had drawn attention to his great capabilities for command, and who was at the time at the head of a brigade in Egypt, was appointed to conduct these several operations. The other Engineers employed were Lieutenant-Colonel Ardagh, C.R.E., and head of the Intelligence Department, to which were also attached Major Wood and Captain Green. Major Chermside, who was at the time serving in the Egyptian army, accompanied them as Political Officer. The 26th Field Company was also with the force under the command of Major

Todd, the other officers being Captain Dorward, Lieutenants Lawson, Burton, and Tuke.

An advanced party under Lieutenant Tuke was landed at Trinkitat on February 19th, where it was employed in constructing piers for disembarking troops and stores, and arranging for the water supply in concert with the navy. Captain Green had the direction of these operations. A few days later the troops landed, and, after a short time spent in the necessary preparations, moved on the 28th to Fort Baker, the scene of Colonel V. Baker's defeat. This had been taken possession of on the 25th without opposition, Lieutenant Lawson with a small body of Royal Engineers forming part of the occupying force.

On the morning of the 29th Graham led his column from Fort Baker to the relief of Tokar. This involved an attack on the enemy at El Teb, where they had made every preparation to resist the advance. In the square formation that was adopted during the action, the 26th Company was placed in the front face in the immediate rear of the Gordon Highlanders. Their loss during the action was one killed and four wounded out of a strength of fifty. Captain Green was also severely wounded, and incapacitated for further participation in the campaign. This action decided the fate of Tokar. The troops advanced on that place without opposition, the Egyptian garrison was relieved, and the force returned to Trinkitat on March 5th. Thus the first object for which Graham had been sent to Suakin was accomplished. It now remained to give Osman Digma another lesson sufficiently severe to prevent all fear of further insult to Suakin itself.

During the marches on Tamai and Tamanieb, undertaken for the purpose of coming into touch with the enemy, the work of the Engineers consisted principally in the construction of zeribas, in providing for the storage and distribution of water, which was managed by Major Wood, and also in obtaining water from natural sources. In these advances five zeribas were made; the first was the restoration of one originally formed by General Baker Pasha about nine miles from Suakin; the second was in the immediate vicinity of Tamai, the troops occupying it on the night previous to the battle; the third was at Handoub; the fourth halfway between Suakin and Tamanieb, and the fifth in the vicinity of Tamanieb, in which the troops spent the night previous to their advance on that place.

At the battle of Tamai the 26th Company became part of the 1st Brigade square, and was formed up in the line of its rear face. Only one man was wounded. The Company poured a very effective fire on the enemy who were threatening that face, and

succeeded in warding them off. The result of these actions was to drive Osman Digma well away from the vicinity of Suakin, and to leave that place free from all fear of further insult for the time.

In both the battles of El Teb and Tamai General Graham displayed the resources of a good commander of troops. As was well said of him, his brilliant tactics at the battle of El Teb, when he turned the enemy's position, were worthy of all praise; whilst at the battle of Tamai, when the onslaught of the fierce and resolute foe produced a temporary check, that very check itself served to show the coolness, presence of mind, and power of the General in remedying it, in rallying his men, and in so thoroughly defeating them.

For their services in this brief but satisfactory campaign, Sir Gerald Graham was promoted to the rank of Lieutenant-General, Majors Wood and Todd to that of Lieutenant-Colonel, and Captain Green to that of Major. Lieutenant-Colonel Ardagh received the distinction of a C.B.

The following extracts from the General Orders issued by Sir Gerald Graham to the troops after the two victories may be quoted. The first is dated March 1st:—

"The object of the expedition is achieved. Tokar has been relieved, and the rebels in arms have been defeated and so thoroughly humbled, that the force before Tokar may safely be reduced. Before the force is broken up, the general officer commanding desires to record his sense of the gallantry and discipline displayed by all arms of the Force which he has had the honour to lead. The cavalry showed the dash which has always characterized that arm. They have also rendered invaluable service in reconnaissance and scouting duties. The action of the infantry was generally characterized by steadiness and firmness in presence of the enemy. The first operation—that of moving to the flank under fire—was very trying to the steadiness of young soldiers, as was also the great daring of the foe in charging to close quarters in face of an overwhelming fire. The result of the action of February 29th has shown the British soldier that as long as he is steady, keeps his formation, and is cool in firing, the desperate rushes of brave blacks only insure their destruction. The Arab has now felt the terrible fire of the British infantry, a lesson not easily forgotten. . . . ."

The second was issued on March 16th:—

"The second task of the expedition has now been accomplished; the rebel army that threatened Suakin is dispersed, and its leader, Osman Digma, is a fugitive in the hills, with a price upon his head. This result you, the officers and men of this small army, have brought about by the discipline and steadiness which you have shown in the performance of the several duties assigned to you. The men who cheer-

fully worked on the wharf all night, who bore the thirst and heat of the march, who quietly endured the dropping fire of the enemy all that night before the battle, these men showed themselves to be the true stuff of which British soldiers are made. There was only one critical moment when discipline was forgotten; but remember, you men of the 2nd Brigade, how, when you rallied and stood shoulder to shoulder, all danger was over, and the enemy no longer faced you. Remember, also, those brave comrades who stood to the last, who cared more for your honour than for their own safety, and who died nobly on that spot where the dead bodies of over 600 enemies showed how dearly they had purchased that temporary success. . . . . ."

When the Suakin expedition had returned to its previous station, the Engineers were distributed as follows, viz. :—

Major-General Lennox to take the place of Lieutenant-General Sir Gerald Graham, in command of a Brigade; Colonel Maitland, C.R.E., with Major Green as Brigade-Major; Lieutenant-Colonel Ardagh, D.A.A. and Q.M.G.; Majors Peck, Spaight, and the 26th Field Company Royal Engineers, commanded by Lieutenant-Colonel Todd, were at Cairo. The 17th Company Royal Engineers was at Ramleh; Major Clarke at Suakin, and Captain Brown at Minieh. With the Egyptian army under Sir E. Wood were Lieutenant-Colonel Fraser, Majors Watson and Chermside, Captain Kitchener, Lieutenants Mantell and Huleatt; whilst in charge of the Irrigation Department were Colonel Scott Moncrieff and Major Ross. Major-General C. G. Gordon had been sent in the beginning of the year to Egypt, to assist the Government in the withdrawal of the garrisons from the Soudan, and had been for some time at Khartoum.

In the month of June, Major Peck and the 17th Company Royal Engineers under Lieutenant-Colonel Wood, Lieutenants Heath and Thomson, were transferred to Suakin. At the same time Major Mulloy, Lieutenants Hawkins and Askwith were ordered from home, the first to Cairo, the others to Suakin.

In August it was determined that an effort should be made to rescue General Gordon, who, after having reached Khartoum, had been besieged there by the forces of the Mahdi before he had completed the removal of the garrison and other Egyptians found in the place. Lord Wolseley was appointed Commander-in-Chief of the forces intended for the expedition to Khartoum.

The following Engineers were named to take part in the operations:—Colonels Webber and Harrison, as Assistant Adjutant-Generals; Colonel Sir C. Wilson, Intelligence Department; Lieutenant Childers, A.D.C.: the 8th Railway Company with Major Scott, Captains Wilson and Von Donop, Lieutenants Ferrier and Vidal; the 11th Field Company with Major Plunkett, Captain

Cockburn, Lieutenants Kenney, Sandbach, and Adair. A Mounted Section of the Telegraph Battalion with Captains Bennet, Wood, and Bagnold, Lieutenants Tower, Stuart, and Hill, and the following other officers: Captains D. C. Courtney, Settle, Barklie, H. Leach, Blackburn, and Leslie, Lieutenants Shaw, Sankey, Littledale, Dumbleton, Nathan, Kincaid, Roper, Leahy, and Luard. About this time Major Chermside was appointed Governor of Suakin.

Lord Wolseley had made his arrangements for pushing his troops up the Nile in whale boats, of which a large number were constructed for the purpose in England, and taken out for the use of the Expedition.

Many of the Engineers were engaged throughout this long and tedious journey in repairing the damages which were constantly occurring to the boats, and were sent forward in advance along the river to establish depôts for the purpose. Others had charge of the railway and telegraph.

A very good description of the voyage from Gemai to Debbeh in five of the whalers was written by Captain Blackburn, R.E., of which the following extracts will give a fair idea of some of the difficulties encountered:—

"On November 1st, 1884, the first portion of the Nile Expedition which went forward in whalers left Gemai, and consisted of the detachment 26th Company R.E., which had been told off to accompany this part of the Expedition. The party, which included Major Dorward, Lieut. Lawson" (Captain Blackburn himself joined it on the following day), "46 N.C.O's. and men, a native Reiss, and 5 Canadians, embarked in whalers Nos. 8, 35, 43, 156, and 378; left Gemai at 8.30 a.m. with a good north-east wind, and after a quick passage reached Sarras by 1 p.m. Here the afternoon was spent in loading up the boats with Engineer equipment, 20 days Nile boat provisions, and 10 days' ordinary rations, making a total weight of a little under 7,000 lbs. in each boat."

On the 2nd they started *en route* for Dal.

"In the course of the day we had to pass four very strong rapids, and had our first experience of towing or tracking, a process at which we got very expert later on." . . . . "Nov. 3rd . . . . The crew of No. 35, after going back about a mile, met No. 378 and hauled her up to the last night's bivouac, she having previously struck a rock and knocked a hole in her starboard side; this, the first hole made during the Expedition, was roughly plugged with tow, and all boats reached Semneh by 11.30 a.m. Here we had our first portage, unloading our boats, loading up all stores, &c., on camels, carrying them thus for about half a mile to the top of the cataract, and there again reloading, the boats having been meanwhile hauled through the cataract. This work was decidedly laborious, the more so as hands were sore and limbs stiff from yesterday's and the morning's rowing . . . ."

"5th Nov. At 6.30 a.m. we girded up our loins for a long day's tracking, and got through the long succession of lower rapids and up to Ambigol proper by 11.30 a.m. Of course No. 378's rudder gave further trouble and No. 43's also got injured. These we repaired whilst dining on the bank, the last rapid having been very stiff and taking three boats' crews to haul up each boat. . . . . We were delayed by a nuggar full of Egyptian soldiers, which would persist in getting in the way and finally ran foul of No. 35's tow rope whilst she was waiting her turn at the big gate of the cataract . . . . by 5.30 all boats were through the gate, and the stores—all which were above the thwarts having been taken out —portaged about 300 yards. The stores were repacked by 6 p.m. and the bivouac formed. This was a hard day, but the men, though exercising the Englishman's privilege of growling, worked extremely well.

"Nov. 7th. Made a start at 6.45 a.m. and were one hour in passing the first rapid in a very awkward corner. The Commandant at Tangier wanted us to portage boats, stores, and everything for a distance of five miles from the corner where the wreck of the *Ghizeh* now lies, and the naval people declared we could not possibly get round, and would certainly wreck our boats. We thought otherwise, and putting two Canadians in each boat and crews on the rope set to work. The chief difficulty was the wreck of the *Ghizeh*, which was much in the way, and No. 43, the first boat got her foremast jammed against the funnel. Sapper Leitch, however, swarmed up the funnel and released the mast to our great relief, as not only was the mast bending as if it must either snap or the thwart go, but there was a considerable amount of risk of the funnel giving way, the *Ghizeh* being quite rotten, in which case, in all human probability, Sapper Leitch would have swelled the list of casualties during the expedition. We took the masts out of the other boats and got them round without further accident.

"8th Nov. . . . . The distance from the bottom to the top of the great gate is about half a mile of certainly the worst water we met; the banks consisted of very slippery and steep rocks. It was considered advisable to unload all stores above the thwarts in No. 43 boat, and with two Canadians in her, two crews on the head rope, and four men on a shorter guy rope to keep her head in against the strong force of the current, we proceeded to track her up, and by 11.50 a.m. had got her safely to the top of the cataract. . . . . No. 156 was next, and we had what might have been a very bad accident, but for the skill and coolness of the two Canadians in her. The bowman had most recklessly trusted to a single hitch in tying the tow rope, though warned by some of our men that it would slip. Slip it did at the very worst part of the gate, the men on the rope going down like a pack of cards, and No. 156 speeding down stream at a very different rate from that at which she had come up. We thought our boat and the two men were gone for good. The Canadians, however, kept their heads, and spying a back eddy, by a well-concerted effort got into it, and were carried into a bay on the opposite island, just opposite where No. 35 was waiting her turn. . . . ."

These extracts are given as samples of the work which went on during the voyage. The journal is full of similar mishaps, and the steps taken to remedy them. At last they reached their destination, and on December 6th we read:—

"On we went, and though we ran on one shoal and had some difficulty in finding our way off in the dark, reached Debbeh at 8.30 p.m., where we were rapturously received by Colonel Tolson and the Royal Sussex as the first whaler of the expedition, the fact of the number 35, being common to both whaler and regiment, being looked on by both sides as a good omen. . . . . The rowing of the men improved immensely, our crack boats in this respect being Nos. 156 and 43. . . . . As soon as the period of sore hands and stiff limbs had been got over they faced the work right well, and at the finish were ready to face any amount of rowing, however hard."

The party pushed on to Korti, and there was divided in two; one detachment proceeding up the river with General Earle's column, the other accompanying Sir Herbert Stewart on camels in his desert march to Metemmeh. Captain Blackburn and Lieutenant Kincaid, with twenty-two Non-commissioned Officers and men were with the former; Major Dorward and Lieutenant Lawson with the latter. Colonel Sir Charles Wilson also joined the desert column as Intelligence Officer. In this capacity he had received special instructions as to his action in communicating with Gordon at Khartoum. Lieutenant Lawson wrote some "Desert Notes from Korti to El Goubat," which give an excellent account of the march; the following extracts may be quoted with interest:—

"The equipment was carried on twelve baggage camels and divided into four sections, viz., (1) Watering, (2) Demolition, (3) Intrenching, and (4) Materials and Miscellaneous. The method on the march was for a mounted Sapper to lead each baggage camel, and for the spare men of each section to ride in a rear rank behind their own baggage camels so as to keep them up to the mark. . . . . Dec. 31st. Halted after a thirty-four miles' march. . . . . No rest for the wicked, however, and still less for the Royal Engineers, who had to start loading up for the afternoon march an hour earlier than anyone else, owing to the large number of camels to be loaded, and the small number of men to do it with. . . . . Halted at 1 a.m. at the wells of El Howeyat; here the Sappers worked at putting up pumps and troughs till 3 a.m.; snatched three hours' sleep till 6 a.m., when up again, load, breakfast, and under weigh by 8 a.m. . . . .

"Jan. 2nd. Directly that Gakdul was reached the Sappers were called into requisition, pumps were put up, canvas water troughs fixed, and the watering of the whole force commenced. . . . . At Gakdul we stayed till the 14th, and had a very happy twelve days of it." (The column had returned to bring up fresh stores.) "Still, there was a good deal of

work to be done; the place had to be put in a state of defence, and the permanent watering arrangements had to be made. . . . . Three hills were finally selected, and on them forts were made; the forts were built of dry stone walls three feet thick, the Sappers doing the building, whilst the Guardsmen found and carried the material . . . . A puddled mud trough was made for the camels and fed from the lower pool by three tripod pumps, whilst the drinking water was brought down from the upper pools by a long line of hosing. . . . .

"Jan. 11th. A convoy under Col. Clarke arrived, bringing with it Capt. Leach, Lieut. Burton, and some N.C.O.'s and drivers of the 26th Comp. R.E., now doing transport work. On January 12th Sir H. Stewart and the main force arrived. . . . . On the 13th we received orders to go on with the force on the morrow. . . . Jan. 16th (8 miles from Abu Klea). "At 1.15 we march, looking a most imposing force. On halting, which was done in the order of march, the Sappers were at once employed in cutting trees and forming them into a zeriba along the left. The afternoon being very hot, the want of water made the work very exhausting, and two of our men collapsed before the day was over. After the zeriba work was finished wire had to be put down in front of weak places, and it was not till long after dark that our work was finished."

"Jan. 17th. A troubled night gave way to an eventful day, any attempt to describe which here would be impossible. The Sappers, between the hours of 7 and 10 a.m., were employed in constructing a fort—afterwards held by the Sussex Regiment—of saddles and biscuit boxes. This had to be done under what was at times a hot cross fire happily without hurt to any of the men. Just before the square moved out we were told off to a biscuit box fort on the left of the zeriba, which we were ordered to garrison; this had to be made smaller to suit our numbers. It did not take long to do this, to broaden the walls and thicken the zeriba, and by the time the force moved out the little work was in a fair state of defence. How anxiously we watched the square in its advance until the falling ground hid it from our sight. In a very few minutes, however, the incessant rattle of musketry, the boom-boom of the 7-pounder, the charge down hill of a motley crowd of Arabs in the direction we knew the square to be in, and followed by their hastier return, told us the crisis had come and gone. Jan. 18th. Reached the wells at 8 a.m., and spent a busy forenoon trying to make bricks without straw, or to provide water for the whole force where there was not the water to be found. . . . .

"Jan. 19th. . . . At about 8 a.m. the ridge top was reached, and below us the Nile and Metemmeh. . . . The Sappers were employed in cutting timber for the flank on which we were, until the enemy's advance made itself felt. This it did by their riflemen opening fire first from the east and later from the north and west sides of the zeriba as well. . . . It was during the first hour that Sapper Chapman was struck by a bullet which, aimed at men on the south side of the zeriba, came over the top and struck him in the back of the shoulder, and being a very dropping shot passed right down his side. As soon as it

was decided to make forts to hold a portion of the force whilst the remainder went out to attack the enemy, there was plenty of work for the Sappers. . . . ."

This was after Sir Herbert Stewart had been wounded, and the command had devolved on Sir C. Wilson.

"Major Dorward and the bulk of the detachment remained to complete the forts and assist in garrisoning them, whilst Lieut. Lawson and nine N.C.O.'s and Sappers with a few entrenching tools accompanied the square. . . . As the square neared the hills behind which the enemy were massed, the dervishes were seen coming over the crest, flags in hand leading on the spearmen. The cheer from the front side of the square as the men there saw the enemy advance was in itself an incident in the day, as was the precision and accuracy of the volleys which checked the charge. How glad every one was to get to the river that night, and to see and taste the Nile again."

The journal gives interesting details of the work of the Engineers whilst at El Goubat fortifying the village, making a fort, &c. &c. This lasted till the end of the month. We then read :—

"February 1st. Stuart Wortley arrived in a rowing boat at 3 a.m., bringing all the bad news: fall of Khartoum, death of Gordon, loss of two steamers, the news of Sir C. Wilson, the Sussex detachment with him and the Egyptian soldiers being on an island thirty miles up stream. . . . ." And again: "Feb. 11th. Fort practically complete. Convoy under Major-General Sir Redvers Buller, accompanied by 500 of the Royal Irish Regiment, arrived at 1 p.m. Major Kitchener, R.E., came as Intelligence Officer, and Lieut. Burton in charge of 300 camels."

This sketch may be completed by recording that the steamers sent down from Khartoum reached Goubat on January 21st. The next two days were spent in the necessary preparations, reconnoitring, and providing for the force left at Goubat in case of attack. This was threatened both from Omdurman and Berber.

On the morning of the 24th, Wilson started with his Acting Aide-de-Camp, Lieutenant Stuart Wortley, Intelligence Department, and a small detachment of troops and sailors, with crews picked from those of the four steamers which had arrived on the 21st. He only took up two vessels, the *Bordein* and the *Tall Howeiya*. The catastrophe may best be given in the words of Lieutenant Stuart Wortley's report on his return, which is dated February 1st, of which the following extracts contain all that is needful :—

"January 28th. Started at 8 a.m. . . . . at noon I saw Khartoum through a telescope, and could see no flag flying from Government House, and the houses appeared to be wrecked. Shortly afterwards the guns at Halfiyeh, four in number, opened fire upon us

and a very heavy musketry fire commenced. This we answered with our guns, and also with volleys at 500 yards. The firing ceased for a few minutes until we were abreast of the Island of Tuti, which we expected to find occupied by Gordon's troops, when a very heavy fire from four guns and of musketry was opened upon us from Omdurman on our right front, and the enemy showed in large numbers with banners in Khartoum. The *Bordein* was in front with the *Tall Howeiya* close behind. The steamers being well protected by armour plates our loss was only one killed and five wounded. . . . . Seeing that Khartoum was occupied by the enemy, and finding it impossible to land under such heavy fire, Colonel Sir C. Wilson ordered the two steamers to go full speed down the river. We were clear of the enemy's fire at 4.15 p.m. Stopped at an island about twelve miles south of Gebel Royan, where we sent out messengers to collect information. They returned shortly, and reported that Khartoum had fallen on the night of the 26th through the treachery of Farag Pasha, who had entered into negotiations with Mahomet Achmet, and had opened the gates of Khartoum to his troops, and that General Gordon was killed, and all his troops."

Tall Howeiya went on a rock on the 29th, not without suspicion of treachery, which was deepened by the fate of her sister ship on the 31st. Stuart Wortley thus describes what took place on the latter day:—

"Jan. 31st. Passed the lowest narrow near the island of Mernat in safety. The *Bordein* dropping down the stream stern foremost. When almost clear of the cataract and within four miles of the enemy's position, the *Bordein* struck a rock very hard, making a large hole in her bow. Water rushed in very fast. She was brought up alongside a small island, and sank to the level of the deck. Sir C. Wilson determined to bivouac on the island, and remain there till relieved. Everything was saved from the steamer except the ammunition. I left the island in a small rowing boat with four English soldiers and eight natives at 6.45 p.m., and floated by the enemy's works, which we passed safely, only a few volleys being fired."

Stuart Wortley arrived at Goubat very early on the morning of February 1st. On hearing his report Captain Lord Charles Beresford started in the steamer *Safia*, one of the two left behind at Goubat by Wilson, and proceeded to the rescue of the ship-wrecked party. This he successfully accomplished after having maintained a sharp action with the hostile batteries on the shore, during which his boiler was pierced. The damage was repaired during the night whilst under fire, and the party brought back in safety to Goubat.

It being now clearly seen that the main object of the expedition had been frustrated, the troops marched back to Korti in detachments under the orders of Sir Redvers Buller, who had arrived to take command for that purpose.

Meanwhile the other detachment of Engineers, under Captain Blackburn, had accompanied General Earle's column up the river, Lieutenant Kenney, with his boat-repairing party of ten Sappers, joining the force. The details of the work performed by the Engineers in this advance were of the same character as that already described on the voyage up to Dongola, and need not be dwelt on. On the day of the battle of Kirbekan Blackburn's boat, No. 35, ran on a rock whilst crossing from one bank to the other, and had to be run on shore for repairs.

"There, in the middle of the cataract, I had to sit watching the repairing of my boat, and listening to the sounds of the action. Kincaid and No. 43 pushed on and reached the zeriba before all was over; but it was 4 p.m. before No. 35 got in, when we heard of the loss of General Earle and Colonels Eyre and Coveney. That evening we buried them under some palm trees, where we trust, as we took some pains to make the ground look as like that surrounding it as possible, their bones will be allowed to rest in peace."

In another entry we read of the destruction of Salamat, where Stewart and Power had been murdered in their voyage down from Khartoum.

"We remained at Salamat all the 18th, destroying Suleiman Wad Gamr's house, the best I saw in the whole of the country; a charge of gun-cotton did good execution. We found many relics of Stewart and Power, some telegrams, a visiting card of Stewart's, and some of Power's letters; also portions of the machinery of their steamer."

The expedition continued its upward course, until February 23rd—

"We were supposed to be only two days from Abu Ahmed; the enemy was said to be waiting for us there in large numbers; the convoy to be on its way across the desert from Korosko, with clothes, boots, &c., and joyfully after dark did we send up rockets to show our where-abouts."

All this was changed the next morning when the order to retire arrived, and sadly the force abandoned all its hopes, and retraced its steps to Korti.

On the receipt of the intelligence of the fall of Khartoum in England, the first impulse on all sides was to persevere in the war, recapture the place, and effectually punish the Mahdi. With this view a railway was to be laid down from Suakin to Berber, and Lieutenant-General Sir Gerald Graham was appointed to command the troops necessary to protect its construction.

The Engineers who were placed under his orders were Colonel Ewart, with rank of Brigadier-General, Colonel Edwards, C.R.E., a Mounted Section of the Telegraph Battalion under Lieutenants Lindsay and Bowles; the 10th Railway Company under Major

Rathborne, Captains Kunhardt and Sim, Lieutenants Molony and Bonham-Carter; the 24th Field Company under Colonel E. P. Leach, Captain Dickinson, Lieutenants M'Carthy, Godby, and Buckland; the 17th Company from Cairo under Lieutenant-Colonel Wood, Lieutenants Heath, A. Thomson, and Layard; a mounted detachment of the 11th Field Company under Lieutenant Sandbach, which was to form part of the Mounted Infantry; a Balloon party under Major Templar, King's Royal Rifle Corps Militia (attached to the Engineers for the purpose), who was assisted by Lieutenant Mackenzie, R.E.

The following additional Engineers also joined Graham:—Lieutenant-Colonel Le Mesurier, Majors Turner (as Director of Telegraphs), Grover, Peck, A. Brooke, and H. W. Smith (Brigade-Major), Captains G. S. Clarke, Acting Military Secretary to Sir G. Graham, Hickson, and St. Clair. An Indian contingent was also sent, consisting of the A Company Madras Sappers under Captains Wilkieson, Romilly, and Lieutenant Newman. An Indian Coolie Corps, to assist at the Railway, with Captain Cather, Lieutenants Tanner, G. Williams, and Learoyd; and an Indian Survey detachment under Lieutenant Longe.

This Coolie Corps, as originally ordered, was composed of 100 artificers and 400 labourers, fully equipped with tools, plant, and materials, and capable of undertaking any ordinary Engineering works with troops in the field. It was subsequently raised to 900 strong, 400 men being specially suited for railway work, with a proportion of gangers.

As regards the 10th Railway Company, it is interesting to record that thirty-nine Volunteers, twenty-five of them from the 1st Newcastle and Durham Engineers, seven from the 1st Lancashire Engineers, and the other seven from various other corps, enlisted for the duration of the war. This was in addition to sixty-eight men not Volunteers, who also enlisted for the same period. Previous to this eighteen Volunteers (principally Engineers) had joined for the Nile Campaign, most of whom came from the North of England. They all served well, and were discharged with much credit in the course of the summer.

The railway was to be supplied with all its plant and necessary workmen by Messrs. Lucas and Aird, such assistance being rendered to them on the spot as the exigencies of the service might permit.

The detail of the work carried on in this short-lived expedition will be found in Chapter III. of Part II. About twenty miles of railway were laid under great difficulties. The enemy were on the alert, and it was necessary, as the line advanced, to construct posts to protect those at work on it, as well as the railway itself. It was in one of the advances made for this purpose by a

party under the command of Sir John M'Neill, that on March 22nd a furious and unexpected onset was made by the Arabs at El Tofrek, whilst a zeriba was under construction. The result was a serious loss of life before the enemy were repulsed.

In the month of May the whole project was abandoned, the troops were recalled, and such portion of the railway as remained unlaid was brought back to England.

The principal casualties in this campaign, as far as the Engineers were concerned, occurred in the surprise at El Tofrek. Captain Romilly and Lieutenant Newman were killed, and Captain Wilkieson severely wounded. These officers were with the Madras Sappers, who suffered fearfully. In the 24th Company Royal Engineers, fourteen Non-commissioned Officers and Sappers were killed and one wounded. Colonel E. P. Leach, in his report, says:—

"The men behaved extremely well under most trying circumstances, especially a small detachment of about 20 (many without rifles) under Lieutenant M'Carthy, who were carried out of the zeriba by the rush of animals and 17th Native Infantry, and subsequently fought their way back to join their comrades."

The officers with the Company on the occasion were Colonel Leach, Captain Dickinson, Lieutenants M'Carthy and Godby. Lieutenant-Colonel Wood, of the 17th Company, was also present, he having guided the column on its march. Captain Romilly lost his life whilst saving that of Lieutenant Drury, of the Bengal Army, who was wounded. He succeeded in his noble effort, but was speared in the back whilst so doing.

The share taken by the Engineers in this disastrous affair was described in a special report drawn up by Colonel Leach. The following extract shows how complete was the surprise:—

"At 1.30 the finished zereba was occupied by the Marines, and the greater portion of the Berkshire regiment moved over to the south zereba, which they were to complete and hold as soon as the Indian contingent started for Suakin. The cutting of the bush on the south and west sides was being carried on by the Madras Sappers. From 1.45 to 2.30 a large proportion of the working parties were at dinner, and as the alarm was raised one of the two Berkshire companies on the northern side was away from its arms, and water was being served out. It should be remembered that the men had been working continuously in a hot sun for two hours, and that every exertion had to be made by both officers and men to complete the zerebas. Two sections of the 24th Company Royal Engineers (50 men under Captain Dickinson) had received orders to move into the finished zereba already occupied by the Marines, the remaining 50 were under orders to return to Suakin, and immediately after their dinners were sent to collect tools, and pack them ready for a move. Notice was given to me personally by General Hudson to this

effect at 2.30 (by my own watch), and the men were warned to be ready at 3 o'clock. This fact bears on the statement made that the troops had notice of the approach of the enemy. At 2.40, without notice of any kind, so far as the men on the northern side of the zerebas were concerned, the alarm was raised and shouts passed for the men to stand to their arms. In the case of the Royal Engineers this was only possible for those who were near the piles. Many succeeded in reaching their arms, others did not. The Arab rush was made simultaneously from both sides of the zereba in which the Gardner guns had already been placed. The zereba was still unfinished, and the Arabs succeeded in carrying the work for a few moments, large numbers of their dead lying piled inside (*sic*) the Gardner guns. The casualties at this point were heavy, but the rush was stopped by the Berkshire regiment. On the eastern side a covering party of the 17th Native Infantry at once fell back upon the central zereba. A portion manned one face, the remainder broke completely through, and made off in a northerly direction, followed by the Arabs. The camel drivers, dhoolie bearers, &c., were thus exposed to direct attack, and in one confused mass followed the Native Infantry through the zereba, carrying with them a large number of men who might otherwise have formed up in both the central and northern zerebas. The confusion was absolute. Fortunately, the crisis passed. The Marines occupying the northern zereba held their own, while a rallying square of two companies of the Berkshire regiment and 20 to 30 men of the 24th Company Royal Engineers, under Lieutenant Godby, drove back a vigorous attack by the Arabs on their immediate front. . . . The casualties in the 24th Company were extremely heavy, including the Company Serjeant-Major and several N.C. Offrs., due partly to the fact that the arms of the Company, which had been piled in advance of the arms of the Berkshire companies, were taken indiscriminately by both corps, partly to the men being separated in the bush collecting tools. Many reached the place where their arms had been piled to find them gone, others had to retire before the fire from the zerebas and Gardner guns."

Lieutenant Askwith was accidentally killed by an explosion at Suakin, on February 27th, and one Sapper was drowned at Semneh. The losses of the Corps from disease were large, amounting to no less than eighty-four Non-commissioned Officers and men.

At the close of the campaign Lord Wolseley wrote a despatch dated June 15th, 1885, in which the following mention is made of Engineer officers:—

"In the Intelligence Department, Colonel Sir C. Wilson, K.C.M.G., C.B., R.E., kept me fully supplied with information as to the enemy's doings and intentions, and shewed himself eminently qualified to conduct the duties of that Department. At Suakin similar information was furnished by the exertions of Major Grover and Major Chermside, both of the Royal Engineers. The last-named was Governor-General of the Red Sea Littoral, and has rendered valuable service to the State for a lengthened period."

Lord Wolseley at the same time named the following officers as "deserving of special mention":—

Colonels Edwards, Sir C. Wilson, and E. P. Leach, Lieutenant-Colonels Ardagh, Fraser, and Wood, Majors Grover, Spaight, Dorward, Scott, Chermside, Kitchener, and Childers, Captains D. C. Courtney, Settle, Yorke, Wilkieson, Bennet, G. F. Wilson, Bagnold, Heath, Thomson, and Lawson, Serjeant-Major Dalton, Lance-Corporal Dale, Sappers Leitch and Benet.

Sir G. Graham, in his despatch dated May 30th, 1885, named Major Grover and Captain G. S. Clarke, as Intelligence officers, and a number of others, most of whom had also been named by Lord Wolseley. The following appear only in Sir G. Graham's list:—Major Whistler Smith, Lieutenant-Colonel Wood, Major Turner, and Lieutenant-Colonel Le Mesurier.

"The following N. C. Offrs. should also be mentioned as having done good service:—Serjeant-Major M. Dalton, Serjeants Donaldson, and D. Lowry."

Sir G. Graham continues:—

"The work done by the Royal Engineers was of a very extensive and varied character. In the construction of zerebas, and in forming defensive posts at Suakin, Hasheen, Handoub, Otao, and Tambouk, in the clearance of dense bush, and in the formation of ground for the railway, in the development of the water supply, and in generally supplying the numerous engineering requirements of an army in the field, the energies of officers and men were heavily taxed, and I cannot speak too highly of the way in which all this work was performed. The officers on all occasions proved their readiness and resource, while the men worked cheerfully under the most trying circumstances. The telegraph service was admirably carried on, and proved of the utmost use to the force. During the action of March 22" (El Tofrek), "communication was maintained by telegraph with the zereba. The railway owes much to the Royal Engineer officers employed in connection with it, while the 10th Company worked and maintained the narrow gauge line, and took charge of the water supply at the base. This company, which only landed on April 7th, had thirty-nine men from the Engineer Volunteers, who had enlisted for the campaign. Of these thirty men came from Newcastle-on-Tyne and Durham, and the remainder from the 1st Lancashire Engineer Volunteers. These men were of all trades suitable for railway work, and their services would have been of great value had the campaign lasted longer. As it was the Volunteers worked well with their comrades of the Royal Engineers, and the officer commanding the company reports most satisfactorily on the admirable spirit and discipline shewn by them. It is interesting to note this fact, as it may be considered the first experiment in associating the Volunteer force with a combatant branch of the Regular Army on active service."

The following rewards were given to the Royal Engineers :—

Lieutenant-General Sir G. Graham to be G.C.M.G., with the 1st Class of the Medjidie.

Colonel Sir C. W. Wilson to be K.C.B.

Colonel E. P. Leach and Lieutenant-Colonel E. Wood to be C.B.

Major H. H. Kitchener, 3rd Class Osmanieh.

Lieutenant-Colonel J. F. Dorward, 4th Class Osmanieh.

Lieutenant H. M. Lawson, 5th Class Medjidie.

And brevet promotion as under :—

Lieutenant-Colonels Ardagh and Fraser to be Colonels.

Majors Grover, Chermside, Scott, Spaight, Dorward, and Kitchener, to be Lieutenant-Colonels.

Captains D. C. Courtney, Settle, Yorke, Wilkieson, Bennet, and Bagnold, to be Majors.

At the close of 1885 a brilliant little campaign was conducted under the command of an Engineer officer, viz., that of Upper Burma, by Lieutenant-General Sir H. Prendergast. This was the fourth occasion on which an army in the field had been entrusted to the guidance of an Engineer, the three previous selections being Sir Robert Napier in Abyssinia, Sir Gerald Graham at Suakin, and Sir Charles Warren in Bechuanaland. The Engineers under Sir H. Prendergast were Colonel G. Sandford, C.R.E. ; Captains Shone, Hickson, Onslow, and Lieutenant Tanner as Field Engineers ; Captain Dickie, Superintending Telegraphs ; the 4th and 5th Companies Bengal Sappers and Miners under Captain Barton, Lieutenants Cairnes and O'Meara ; the B, D, H Companies and Telegraph detachment, Madras Sappers and Miners under Captains Dorward, Badgley, and Andrews-Speed ; Lieutenants Barnet, Anderson, Learoyd, Stewart, Glanville, Beevor, and Renny-Tailyour ; the 2nd Company Bombay Sappers and Miners under Captain Fullerton, Lieutenants Biggs and Baddeley.

The army left the frontier of British Burma on November 14th, to push its way up the Irrawaddy in steamers. They encountered numerous obstacles on the way in the form of batteries thrown up to oppose their advance. These were captured and destroyed. In one instance only, viz., at Minhla, was any serious resistance offered or much loss sustained. The marvellous rapidity with which Prendergast forced his way up the river completely disconcerted the Burmese attempts at defence, so that when he arrived in the vicinity of Mandalay on November 28th the war was practically closed by the unconditional surrender of the King and his army.

The Governor-General of India in Council, in a General Order dated May 14th, 1886, says :—

"In directing the publication of the despatches regarding the recent operations in Upper Burma, which resulted in the capture of Mandalay and the overthrow of King Theebaw, he desires to place on record his cordial recognition of the admirable manner in which Lieut.-Genl. Sir H. N. D. Prendergast, K.C.B., V.C., and the troops under his orders, carried out the task set before them. By rapidity of movement, by skilful strategy, and by the exercise of humane forbearance, Sir Harry Prendergast has succeeded, with comparatively little loss to the force under his command, and without unnecessary bloodshed or undue severity towards the enemy, in occupying Mandalay, in capturing its King, and taking possession of the whole of Upper Burma."

The occupation of the country has been since then attended with much difficulty, the attacks of the Dacoits, who have infested the whole province, giving much trouble. A large force of Engineers has consequently been rendered necessary, and the following additional names may be given of those who have joined in the further operations, viz., Colonel J. Hills, Majors Spratt (Brigade-Major) and Wilkieson, Captains R. O. Lloyd, A. Cockburn, Lutyens, Appleton, and Goodwyn; Lieutenants Kelly, Sandbach, Aylmer, Petrie, Morton, Wade, Pringle, Serjeant, Bonham-Carter, Bullen, G. Palmer, Lawrence, Dealy, H. Wright, Rimington, Hunter, Roe, Edgell, Ewbank, Chapman, Tulloch, Stokes-Roberts, Huleatt, Close, Sorsbie, Perceval, Tilly, and Duff. Major Cather has during the time acted as Director of Transport. Of these, Captain R. O. Lloyd and Lieutenant O'Meara, have been severely wounded.

In conclusion, it will now be necessary to take up the history of the gradual expansion of the Corps since 1854. It will be remembered that when the Russian War broke out the strength was raised to seven battalions, the last of which had been added on April 1st of that year. This increase proved insufficient, and in the following spring a half battalion was granted of twenty-four officers. On this occasion the rank of Second Lieutenant was abolished, all subalterns being for the future called simply Lieutenants. No increase of pay was permitted by this change, the junior third of the list receiving the old Second Lieutenant's pay of 5s. 7d.

In 1861 another half battalion of officers was added, bringing the total up to eight.

On April 1st, 1862, the amalgamation of the Royal Engineers with those of the Honourable East India Company took place, in consequence of the assumption of the government of India by the Crown. The officers were retained on their separate lists for promotion, but were now furnished with commissions from the Queen. The Seminary at Addiscombe, which had hitherto been the source whence the Indian Engineers were drawn, was broken up, the supply for the amalgamated Corps being in future entirely pro-

vided by the Royal Military Academy at Woolwich. The old Indian lists are gradually dying out, no rank now remaining ower than that of Lieutenant-Colonel. By this change the Corps became suddenly enlarged to fifteen battalions, the Indian lists having been equivalent to seven, three of which were for Bengal, and two each for Bombay and Madras.

On April 1st, 1874, two more were given to supply the demand of officers for India. This is the last augmentation that has taken place so far as the number of the battalions is concerned. There have, however, been many changes in the numbers of the officers in each rank, so much so that the battalion system may be considered to have completely fallen through. In 1872 the rank of Second Captain was abolished. The old list of Captains was converted into Majors, and the Second Captains became Captains in their place, receiving allowances as such. At the same time the difference in pay between the senior and junior Lieutenant-Colonels was swept away, all for the future receiving full Lieutenant-Colonel's pay. In 1885 the rank of Regimental Colonel was abolished, the existing holders of that grade being permitted to continue as such until they were promoted or retired. This has now been very nearly completed. The latest alteration has been the restoration of the grade of Second Lieutenant, which occurred at the commencement of 1887.

The foregoing sketch is only intended to touch upon the principal changes which have been from time to time effected. Further details will be found in the Second Part, under the head of Organization, which, it is trusted, will render the history of the Corps complete.

PART II.—ORGANIZATION.

CHAPTER I.

The Board of Ordnance—The Engineer Staff.

The History of the Master-General and Board of Ordnance—Their Duties—The Respective Officers—The Ordnance Corps under the Board—List of the Master-Generals—Abolition of the Board of Ordnance—The Chief Engineer—The Inspector-General of Fortifications and his Assistants—List of Inspector-Generals and of the Engineer Staff.

Reference has repeatedly been made in Part I. of this work to the Master-General and Board of Ordnance, under whose fostering care the Corps of Royal Engineers was developed. It may not be out of place to devote a brief chapter at the commencement of this Part to a sketch of the rise and constitution of that august body.

It is not easy to determine with accuracy when the first Master-General was created. In the fourteenth and fifteenth centuries an office existed, the holder of which was entitled the Master of the Ordnance, but during the greater portion of that period he was merely the chief of the Train assembled as part of an expeditionary force. The Ordnance did not represent the Artillery only, nor indeed in those days was the Artillery the most important part of the Train. It embraced, as well, all matters connected with engineering and military stores; and the Master of the Ordnance was over it all. Gradually the title became changed into that of Colonel Commanding the Train, and was dropped so far as the signification which it had hitherto held. It seems to have been revived to represent a far higher post than that of the simple head of a temporary Train, and to have been then bestowed upon the officer who had supreme control over all the King's Ordnance.

In Kane's Artillery List the first Master recognized by him in the latter capacity is Sir Thomas Seymour, appointed about 1537. Duncan, in his "History of the Royal Artillery," claims a Master as far back as 1483, when, according to him, Rauf Bigod was appointed to the post for life, and was succeeded by Sir Richard

Gyleford and Sir Sampson Norton, both of whom served before Seymour. The matter is not one of great importance in its bearing on the Royal Engineers, and a mere record of the discrepancy is all that seems needful. From an early date the Master had a Deputy, called the Lieutenant of the Ordnance, and these two conducted the business of the King's Ordnance for many years before other posts were created and affiliated to them so as to form the Honourable Board of Ordnance. The title of Master was not developed into that of Master-General until the year 1604, the Lieutenant at the same time becoming Lieutenant-General. When the Board of Ordnance was formed it included, besides the Master-General and Lieutenant-General, four other officers, called the Surveyor-General, the Clerk of the Ordnance, the Storekeeper, and the Clerk of the Deliveries.

The duties of these officers, under their chief the Master-General, were as follows: The Lieutenant-General had the control of all the *personnel*, viz., the officers and men of the Artillery, Engineers, and Store Department,

"and acted as a sort of Adjutant to the Master, who looked to him for all information connected with the various Trains of Artillery in the Tower and elsewhere . . . . and also to see that all officials connected with the Department did their several duties."—(Duncan.)

The Surveyor-General had charge of the *matériel*, and he was responsible that the various munitions of war and other military stores were maintained in a proper state of efficiency.

The Clerk of the Ordnance conducted the correspondence of the Board, and regulated its finances. He was, in short, a kind of Chancellor of the Exchequer, and on him devolved the duty of providing for the ways and means, a service which he too often found it very difficult to perform, owing to the niggardliness with which supplies were granted to the Honourable Board. The Storekeeper and the Clerk of the Deliveries carried on the duties expressed by their titles.

The position of the Master-General and the various members and servants of the Board of Ordnance was first reduced to systematic form in Charles II.'s reign, while Lord Dartmouth was in office, and was confirmed in many subsequent Warrants. In one issued by James II., dated May 13th, 1686, it is laid down that the Master-General should have—

"the rank as well as the respect due to our youngest Lieutenant-General. And that our will and pleasure is that he command in our Garrisons as formerly, but do not take upon him the charge or command as a Lieutenant-General in the field without our special commission or appointment."

"The relative rank awarded to the Master-General entitled him, when passing through any Camp or Garrison, to a guard of 1 officer, 1 serjeant, and 20 men; the guards were compelled to turn out to him, and the drums to beat a march; and the officers and soldiers of the regiments he passed had to turn out at the head of their respective camps. . . . When the Master-General took the field in time of war in his official capacity he was attended by a Chancellor, thirty gentlemen of the Ordnance, thirty harquebussiers on horseback, with eight halberdiers for his guard, two or three interpreters, a minister or preacher, a physician, a master surgeon and his attendant, a trumpeter, kettle drums, and chariot with six white horses, two or three engineers, or more if required, and two or three refiners of gunpowder."—(Duncan.)

In the later years of its existence a miniature counterpart of the Board was set up in every garrison, consisting of the Commanding Officers of Artillery and Engineers, with the Storekeeper. The powers of this Committee, known by the title of the Respective Officers, were on many points very extensive. They only recognized the Board as their masters, and reported direct to that body, without any reference to their own immediate chiefs. It may well be imagined that such a system, being as it was an *imperium in imperio*, worked badly, and was the source of constant irritation. The Honourable Board were, moreover, jealous of any interference with the powers of their subordinates, and supported them most energetically whenever they came into collision with their military superiors.

"The presence in every garrison of that band of conspirators known as the Respective Officers, who represented the obstructive Board, and whose opinion carried far more weight than that of the General commanding, was enough to irritate that unhappy officer into detestation of the Honourable Board and all connected with it."—(Duncan.)

In addition to their duties in the maintenance of that portion of the national forces which was under their jurisdiction, the civil functions of the Board were very extensive. They were large landowners, all that now comes under the head of War Department lands being under their control; they had the construction and maintenance of all works of fortification, barracks, and civil buildings, including the military manufacturing establishments, and they passed separate estimates through Parliament for their own use, amounting in later times to several millions per annum.

The position of the Artillery and Engineers, as large military corps under a totally separate jurisdiction from the remainder of the army, brought with it many benefits, but at the same time considerable countervailing disadvantages. On the score of allow-

ances they, and especially the Engineers, were great gainers. In the matter of quarters, the Board took especial care of its own children. The house allotted to the Commanding Engineer was sure to be the largest and most commodious building in the place. The lands, which at many of the more important stations were very extensive, became his perquisite, and added greatly to the emoluments of his office. In these and many other minor particulars the Corps enjoyed privileges which did not fall to the lot of others. At the same time, these benefits were counteracted by drawbacks. The army at large was disposed to look with some jealousy on these departmental Corps, and there was an absence of that feeling of *camaraderie* so essential in the units of a fighting force. Generals were also apt to look coldly on men who, although nominally under their command, were in reality only partially amenable to their control. It was a system which had grown up gradually, and the pernicious effects of which did not therefore attract much attention; still, unquestionably, it was very prejudicial to discipline. It seems strange that it should have been permitted to remain so long in force, and that it should not have been until the middle of the nineteenth century that its abolition was decreed.

The following is a list of the Master-Generals subsequent to Sir Thomas Seymour:—

Sir Thomas Darcie	1545
Sir Philip Hoby	1548
Sir Richard Southwell	1554
Ambrose Dudley, Earl of Warwick	1559

This officer held the post for upwards of thirty years, and at his death it was placed in commission, the Lord Treasurer, the Lord High Admiral, the Lord Chamberlain, and the Vice-Chamberlain being the Commissioners.

Robert, Earl of Essex, was appointed in	1596
Charles, Earl of Devonshire	1603
Lord Carew, afterwards Earl of Totnes	1608
Howard, Lord Vere	1630
Mountjoy, Earl of Newport	1634

During his time came the Rebellion and the Commonwealth, and he seems to have held his post throughout. When Charles II. was restored to the throne he removed the Earl, and in his place appointed—

Sir William Compton	1660

On his death in 1664, Commissioners were again selected.

They were John Lord Berkeley of Stratton, Sir John Duncombe, and Thomas Chicheley.

This Commission lasted till 1670, when one of their number, Sir Thomas Chicheley (he had meanwhile been knighted), was made Master of the Ordnance. On his death in 1679, the office was again placed in commission, the Commissioners being Sir John Chicheley (son of the late Master), Sir William Hickman, and Sir Christopher Musgrave. This Commission lasted till 1682, when George Lord Dartmouth was appointed Master-General. On the deposition of James II., his successor, William III., removed Lord Dartmouth, and selected Frederick Duke of Schomberg to fill the place. On the death of Schomberg at the battle of the Boyne, the post remained vacant until 1693, when Henry Viscount Sidney, afterwards Earl of Romney, was appointed Master-General, and held the office until 1702. He was then followed by—

John Earl of Marlborough .. .. 1702 to 1711.

On his disgrace, he was succeeded by Richard Earl of Rivers, who only held the post for a few months.

His successor, James Duke of Hamilton, was also a very brief holder of office, as he was killed in a duel in November, 1712.

At his death the post remained vacant for two years, when John, now Duke of Marlborough, was reinstated in 1714, and held it till his death in 1722.

William Earl of Cadogan..	1722
John Duke of Argyle and Greenwich	1725
John Duke of Montague	1740

At his death, in 1749, the office remained vacant till 1755.

Charles Duke of Marlborough	1755
Field-Marshal Viscount Ligonier	1759
John Marquis of Granby	1763

On his resignation, in 1770, it remained vacant for two years.

George Viscount Townshend	1772
Charles Duke of Richmond	1782
George Viscount Townshend (reappointed) ..	1783
Charles Duke of Richmond (reappointed) ..	1784
Charles Marquis Cornwallis	1795
John Earl of Chatham	1807
Henry Earl Mulgrave	1810
Arthur Duke of Wellington	1819
Henry Marquis of Anglesey	1827
Viscount Beresford	1828
Sir James Kempt	1830

Sir George Murray	1834
Lord Vivian	1835
Sir George Murray (reappointed)	1841
Henry Marquis of Anglesey (reappointed)	1846
Henry Viscount Hardinge	1852
Fitzroy Lord Raglan	1852

He was the last holder of the office, and on his death in the Crimea, in 1855, it was suppressed, as thus recorded by Clode, in his "Military Forces of the Crown": —

"From the first Cabinet at which Lord Palmerston ever sat as Premier, the Secretary at War brought home half a sheet of paper, containing a memorandum that the Ordnance—one of the oldest Constitutional departments of the Monarchy . . . . was to be abolished."

The Russian War had brought into prominence all the defects of the system, and a clean sweep was made of the Master-General and his Honourable Board.

The Order in Council, by which this was done, was dated on June 6th, 1855. It revoked the Letters Patent constituting the Master-General, Lieutenant-General, and Principal Storekeeper of the Ordnance, and in lieu thereof appointed a number of officers to carry on the duties hitherto performed by them.

We will now revert to the history of the office of Inspector-General of Fortifications, under its former title of Chief Engineer. This post appears to have been very ill defined before the Restoration. Indeed until after that event no one individual can be said to have exercised control over the whole Engineer service of the Kingdom. The title of Chief Engineer seems first to have crept in to denote the officer who held the highest post in that branch of duty in the Trains that were brought together for particular campaigns. Later on it simply marked the highest grade awarded to an Engineer, there being two and sometimes three Chief Engineers serving at the same time, no one of whom had any control over the others. A note in Part I., page 45, refers to this point, and names three Chief Engineers, all holding that rank simultaneously.

At the reorganization of the forces of the Crown after the Restoration, this was changed, and Sir Charles Lloyd was appointed at the head of a small establishment of Engineers. Twenty-three years later a Warrant was issued defining the status of the office, which had been conferred on him in 1660, and which was then held by his immediate successor, Sir Bernard de Gomme. In this Warrant the title of Principal Engineer was used, and it is the only case in which that term has been employed;

but the position referred to is that which was known as Chief Engineer of the Kingdom.

Taking the Restoration as our starting point, the list of Chief Engineers from 1660 to 1802 is as follows, with the dates of their appointments :—

Colonel Sir Charles Lloyd, September, 1660.
Sir Bernard de Gomme, April 1st, 1661.
Colonel Sir Godfrey Lloyd, December 27th, 1661.
Colonel Sir Martin Beckman, December 9th, 1685.

This officer died in 1702, after which the post remained unfilled for nine years, the next appointment being—

Brigadier Michael Richards, September 11th, 1711.
Major-General John Armstrong, December 9th, 1714.

It was under the sway of this officer that the Engineers were formed into a Corps.

Colonel Thomas Lascelles, July 27th, 1742.

This officer died in 1751, and the post remained again unfilled for six years.

Colonel William Skinner, May 19th, 1757.
Colonel James Bramham, January 24th, 1781.
Major-General Sir William Green, Bart., November 15th, 1786.

On General Green's retirement, in 1802, the title of Chief Engineer was abolished, and that of Inspector-General of Fortifications substituted.

This was effected by means of a Royal Warrant, issued on April 21st, 1802, in which is the following paragraph :—

"And whereas by the above new Establishment of Our Corps of Royal Engineers We have thought proper to discontinue the Office and Title of Chief Engineer, We do hereby direct that you or the Master-General of the Ordnance, for the Time being, do select from Time to Time from among the Senior Officers of Our Corps of Royal Engineers such Officer as from his Knowledge, Experience and Abilities you shall judge most proper to perform the important Duties hitherto entrusted to the Chief Engineer, and which said Duties he is to execute under the Style and Title of Inspector-General of Fortifications and Works, as well as of all Corps attached to the Engineer Department of our Ordnance, &c., &c."

Inspector-Generals of Fortifications.

Lieutenant-General Robert Morse, May 1st, 1802.
Lieutenant-General Gother Mann, July 23rd, 1811.
Major-General Sir Alexander Bryce, April 10th, 1830.
Major-General Robert Pilkington, October 24th, 1832.
Major-General Sir Frederick Mulcaster, July 16th, 1834.
Major-General Sir John Burgoyne, July 17th, 1845.

We have already seen that in the year 1855 the Master-General and Board of Ordnance were abolished. From this time the Inspector-General of Fortifications became an officer serving directly under the Commander-in-Chief, and the Corps of Royal Engineers, as well as the other so-called Ordnance Corps, fell under the direct jurisdiction of the Horse Guards.

In the year 1862 a very important Circular Memorandum was issued, affecting the position of the Inspector-General of Fortifications and his Assistants. In that document the following changes were decreed:—

1st. The Inspector-General of Fortifications was to be in future designated the Inspector-General of Engineers and Director of Works. He was to be considered as a General Officer on the Staff of the army, holding the position of a Divisional General as regarded his own special Corps, whilst at the same time he was to be a departmental officer and the head of the barrack fortification and other works branches. He was to be in direct communication with the Commander-in-Chief as Inspector-General of Engineers, and with the Secretary of State for War as Director of Works.

2nd. The office of Deputy Inspector-General was abolished, and in its place two Assistant Directors of Works were to be appointed, one for the Fortification and the other for the Barrack branch.

Inspector-Generals of Engineers and Directors of Works.

General Sir John Burgoyne, Bart., September 27th, 1862.
Major-General Edward Frome, January 20th, 1868.

On the resignation of Major-General Frome in the following year the two titles were separated, and Major-General Sir John William Gordon was appointed simply Inspector-General of Engineers, on June 1st, 1869, and during his life no one was named Director of Works, the office being held in abeyance. Sir John Gordon died on February 8th, 1870, and it was not till five months later that his successor was selected. The two posts were then re-united, and the title of Inspector-General of Fortifications revived.

Inspector-Generals of Fortification and Directors of Works.

Major-General Sir Frederick Chapman, July 1st, 1870.
Major-General Sir Lintorn Simmons, July, 1st, 1875.
Major-General Thomas Gallwey, August 1st, 1880.
Major-General Sir Andrew Clarke, June 10th, 1882.
Lieutenant-General Lothian Nicholson, July 8th, 1886.

In November, 1886, a General Order was issued altering the Queen's Regulations, and defining the position as a General Officer on the Staff of the Army of "the Inspector-General of Fortifications, who is also the Director of Works . . . . holding the position of Inspector-General of Royal Engineers."

On the abolition of the Ordnance Department, which took place in 1888, and the consequent rearrangement of the War Office under the two heads of Finance and Military Departments, the Order in Council, which is dated February 21st, 1888, defines the duties of "the Inspector-General of Fortifications and Inspector-General of the Royal Engineers," the title of Director of Works being dropped.

In the Warrant of 1862 reference is made to the post of Deputy Inspector-General of Fortifications as being from that date abolished. The holders of the office, from its establishment in 1807, had been as follows :—

Colonel William Fyers, August 31st, 1807.
Lieutenant-Colonel John Rowley, December 4th, 1811.
Colonel Alexander Bryce, December 2nd, 1824.

On the promotion of Sir Alexander Bryce to the higher office of Inspector-General of Fortifications in 1830 no further appointments were made of Deputy Inspector-Generals until the Russian War—

Captain Robert Laffan, June 8th, 1855.
Lieutenant-Colonel Henry Harness, July 1st, 1855.
Major Henry Owen, April 8th, 1856.
Major-General Thomas Foster, August 31st, 1860.

In 1862 the post was abolished. In the course of 1888 it was revived, there being two holders, one for Fortifications and the other for Barracks and Civil Buildings, viz., Colonel Arthur Durnford and Colonel Henry Locock.

The post of Assistant Inspector-General of Fortifications has been held as follows :—

Lieutenant-Colonel John Rowley, July 1st, 1806.
Major Cornelius Mann, November 1st, 1814.

In the year 1830 the office was doubled.

Lieutenant-Colonel Edward Fanshawe
Major John Wells } April 30th, 1830.
Lieutenant-Colonel Alexander Brown, August 4th, 1842.
Lieutenant-Colonel Ralph Alderson, July 1st, 1844.

Major Henry Sandham, March 11th, 1848.
Colonel George Harding, October 1st, 1850.
Lieutenant-Colonel John Walpole, February 5th, 1855.
Captain Robert Laffan, May 30th, 1855.
Captain Henry Owen, June, 1855.
Major William Jervois, April 8th, 1856.
Captain Edward Belfield, November, 1856.
Captain Douglas Galton, December 31st, 1859.

The appointment was abolished in 1862, but in 1888 it was revived, and the holders of the office are now Colonels C. J. Moysey, R. H. Vetch, Lieutenant-Colonels G. E. Grover and E. M. Lloyd.

The following officers have held the post of Deputy Directors of Works since its institution in 1862 :—

Lieutenant-Colonel William Jervois (Fortifications), September 5th, 1862.
Captain Edward Belfield (Barracks), September 5th, 1862.
Lieutenant-Colonel Thomas Murray (Barracks), September 17th, 1867.
Colonel Charles Ewart (Barracks), October 30th, 1872.
Colonel Charles Nugent (Fortifications), May, 1875.
Colonel Philip Ravenhill (Barracks), November, 1877.
Colonel Joshua Smith (Fortifications), January 1st, 1881.
Colonel R. N. Dawson-Scott (Barracks), November 1st, 1882.
Colonel Henry Schaw (Fortifications), July 1st, 1883.
Colonel Arthur Durnford (Fortifications), January 8th, 1887.
Colonel H. Locock (Barracks), November 1st, 1887.

The following officers have held the post of Assistant Directors of Works since its institution in 1873, when three were appointed :—

Lieutenant-Colonel Charles Nugent (Fortifications), April 27th, 1873.
Lieutenant-Colonel Edward Gordon (Barracks), April 27th, 1873.
Lieutenant-Colonel Philip Ravenhill (Barracks), April 27th, 1873.
Lieutenant-Colonel William Crossman (Fortifications), July, 1875.
Colonel Joshua Smith (Fortifications), October, 1875.
Lieutenant-Colonel G. E. Walker (Barracks), May, 1876.
Colonel Gerald Graham (Barracks), December, 1877.
Colonel Henry Schaw (Fortifications), January 1st, 1881.
Lieutenant-Colonel R. N. Dawson-Scott (Barracks), April 8th, 1881.

Major H. Locock (Barracks), December 23rd, 1881.

Major W. Salmond (Barracks), April 1st, 1883.

Lieutenant-Colonel Arthur Durnford (Fortifications), July 1st, 1883.

Colonel C. J. Moysey (Barracks), October 1st, 1884.

Lieutenant-Colonel R. H. Vetch (Fortifications), December 11th, 1884.

Major Jasper Davies (Fortifications), April 16th, 1885.

Lieutenant-Colonel G. E. Grover (Barracks), January 14th, 1887.

Major E. M. Lloyd (Fortifications), January 15th, 1887.

It has been shown in Part I. of this History, that in the seventeenth and eighteenth centuries Engineers were freely employed on the General Staff of the army. The following list shows some of the most important of those services:—

Sir Charles Lloyd, Quartermaster-General to the Forces, in 1640.

Sir Bernard de Gomme, Quartermaster-General to the Forces, in 1642, 1645, 1649.

Colonel du Cambon, Quartermaster-General in Ireland and Flanders, 1689.

Colonel Peter Carles, Quartermaster-General in Portugal, 1703.

Captain John Armstrong, Deputy Quartermaster-General in Flanders, 1709; and as Colonel John Armstrong, Quartermaster-General to Forces, 1712 to 1742.

Colonel Richard King, Quartermaster-General in Canada, 1711.

Colonel Thomas Lascelles, Deputy Quartermaster-General to the Forces, 1712 to 1751.

Captain David Watson, Deputy Quartermaster-General in North Britain, 1746; and as Colonel David Watson, Quartermaster-General in North Britain, 1756 to 1761.

Lieutenant-Colonel Robert Clerk, Deputy Quartermaster-General, Expeditions in France, 1758.

Captain-Lieutenant Hugh Debbieg, Assistant Quartermaster-General in Louisburg, 1758.

Lieutenant-Colonel William Cunningham, Deputy Quartermaster-General, Expedition to West Indies, 1758.

Lieutenant-Colonel George Morrison, Deputy Quartermaster-General, North Britain, 1761; then vice Watson, Quartermaster-General, 1761; afterwards Quartermaster-General to the Forces, England, 1763 to 1799.

Major William Roy, vice Morrison, Deputy Quartermaster-General, North Britain, 1761.

Captain-Lieutenant Robert Morse, Assistant Quartermaster-General to the Forces, 1765 to 1774.

Captain David Dundas, Quartermaster-General in Ireland, 1775; afterwards as Major-General D. Dundas, Quartermaster-General to the Forces, 1796.

Lieutenant-Colonel James Moncrieff, Deputy Quartermaster-General in North Britain, 1790; afterwards as Colonel James Moncrieff, Quartermaster-General in Holland, 1793.

Captain John Rutherford, Assistant Quartermaster-General in Holland and Western District, 1798-9.

Originally the appointments to the Quartermaster-General's department were given by the Crown on the recommendation of the Secretary at War, under whose orders these officers acted, subject to the control of the Generals in command.

On the formation of the Royal Staff Corps in 1800, the object of which was the supply of well-trained officers for the duties of the Quartermaster-General's department, Captain John Rutherford, R.E., was named the first Commandant.

The appointment of Deputy Adjutant-General to the Corps only dates from 1855. The holders of the office since then have been as under:—

Colonel Edward Matson, July 1st, 1855.
Lieutenant-Colonel John William Gordon, October 18th, 1856.
Colonel Frederick Chapman, September 1st, 1860.
Lieutenant-Colonel the Hon. Hussey F. Keane, January 1st, 1866.
Colonel James F. M. Browne, January 1st, 1871.
Colonel John Grant, January 1st, 1876.
Colonel Sir John Stokes, April 1st, 1881.
Colonel Robert Grant, July 1st, 1886.

The office of Brigade-Major to the Corps, changed in 1846 into that of Assistant Adjutant-General, has been held as follows:—

Captain John Rowley, May 1st, 1802.
Captain John Handfield, November 1st, 1806.
Captain Charles Ellicombe, January 9th, 1821.
Captain Edward Matson, July 25th, 1842.

Assistant Adjutant-Generals.

Lieutenant-Colonel Edward Matson, June 15th, 1846.
Lieutenant-Colonel Frederick Yorke, December 17th, 1855.
Lieutenant-Colonel Edward Stanton, August 1st, 1858.
Major the Hon. Hussey F. Keane, January 1st, 1861.
Colonel James F. M. Browne, January 1st, 1866.

Changed to Deputy Assistant Adjutant-General.

Captain Robert Grant, January 1st, 1871.
Lieutenant-Colonel R. N. Dawson-Scott, January 1st, 1877.
Major E. Micklem, October 1st, 1879.

Reverting to Assistant Adjutant-General.

Major E. Micklem, May 20th, 1882.
Lieutenant-Colonel W. Salmond, October 1st, 1884.

CHAPTER II.

The Royal Engineer Troops.

Bridge Equipment in the Peninsula in 1813—In Paris in 1815—Peace Reductions—Difficulties in the Crimea—Formation of the A Troop—Equipment of the Turkish Contingent—Lasso Draught—Attempts to abolish the Troop—The Trent Expedition—State of Pontoons in store—Sir J. Burgoyne's memo on Engineer Field Train—Formation of Pontoon and Equipment Troops—Their composition—Army Signalling—Franco-German War—Establishment of C or Telegraph Troop—Appointment of Field Officer as Commandant to the Train—Bridge across the Thames before the Queen—Creation of Field Companies—The Telegraph Battalion—The Pontoon and Telegraph Troops in Egypt—List of Commanding Officers of the Train—The Mounted Detachment.

The mobilization of the Engineer branch of the army has until of late years been greatly neglected in England. During the wars of the eighteenth century the necessity for this service was but very partially realized; the want of a fairly mobile Engineer force having been usually supplied by our allies. It was only when, in the Peninsular war, we found ourselves acting in conjunction with a nation as deficient as ourselves in all that related to Engineer equipment, that the evil became glaringly apparent.

It has already been shown, in the Chapters treating of the war in Spain and Portugal, how utterly unprovided the British army was for the first few years with all that would have facilitated its Engineer operations, and how as the war proceeded those wants were gradually supplied. When the struggle against France ended with the crowning victory of Waterloo, the transport of Engineer equipment was on a very fairly satisfactory footing. The bitter lesson of disaster and unnecessary loss of life had borne fruit, and commencing with the winter of 1812-13 the bridge and field stores of the Corps were by degrees as amply developed, and became as well looked after, as were the wants of the other branches of the service.

We have, in a report of Lieutenant-Colonel Sir R. Fletcher, R.E., a detail of the first regular bridge train which had been got together in the winter of 1812-13, and commenced to move

with the army in the month of April of the latter year. This Train consisted of the following *personnel*:—

2 officers of Royal Engineers	2
1 Superintendent, 1 Civil Master Artificer, 7 Civil Artificers, and 10 Sappers and Miners	19
1 Lieutenant, 2 Ensigns, 4 Boatswains, and 60 seamen of the Portuguese Navy	67
1 Deputy Assistant Commissary-General, 2 Clerks, 5 Conductors, and 250 Drivers	258
Total *personnel* ..	346

520 oxen, 283 draught horses, and 28 riding horses.

The bridge was about 250 yards in length, and the Train comprised—

33 carriages with pontoons.
3 „ with spare baulks and chesses.
3 „ with spare wheels.
1 „ with spare rope of sorts.
1 „ with small boat.
1 „ with camp equipage.
4 wagons with small stores.
2 forge wagons.

The pontoons were 4 ft. 10 in. wide, and the baulks were of a length to admit of their being placed at a distance of 22 ft. from centre to centre.

This report closes with a list of no less than sixty-eight accidents, some grave, but the majority slight, which occurred during the march from Abrantes to Sardura between April 24th and May 14th, 1813; showing clearly the folly of postponing the organization of such a train until the moment when its services were actively required.

It has been seen in the foregoing list that much of the draught was furnished by means of oxen, but the experiment of the march alluded to proved to the Duke that such a system could not work. We find him therefore, on May 4th, writing as follows to Colonel Fisher, R.A. :—

"Sir,—Two hundred and sixty-four horses are required to draw forty-four carriages in the pontoon train, which it is necessary should be drawn by horses after its arrival at Sabugal.

"In order to procure these horses it is necessary that those now employed in the draft of Capt. Cairns' brigade of 9-pounders now at Penamacer, and those employed in the draft of carriages in the reserve of the artillery now at Covilhão should be at Sabugal on the day the pontoon train arrives there. . . .

"The bullocks now employed in drawing the pontoon train will till further orders be employed in drawing the carriages of the artillery, and you will give orders to Lt.-Col. Dickson to have as many carriages prepared for bullock draft as may be necessary.

"When the horses now on their road from Lisbon shall arrive Capt. Cairns' brigade must be horsed, then the 18-pounder brigade, then the ball cartridge carts, and lastly the reserve of gun ammunition and those of the last which cannot be horsed must be drawn by the bullocks of the pontoon train.

"I have, &c.
(Sd.) "WELLINGTON."

It has been shown that the first experiences of the new equipment were not very satisfactory, and numerous paragraphs in the Duke's despatches are eloquent on the subject. Thus he writes to Earl Bathurst on May 11th, 1813 :—

. . . . "We have been sadly delayed by the movements of our bridge, without which it is obvious we can do nothing ; the equipment is quite new, and has marched only from Abrantes, but there has already been much breakage, and I understand the carriages are shamefully bad. I shall have sad work with this bridge throughout the campaign, and yet we can do nothing without it."

And again on May 18th he writes once more to Earl Bathurst—

. . . . "As the operations of the army will depend principally upon the efficiency of this train, and as it has already occasioned a delay of several days, and as it has been necessary to dismantle some of the carriages of the Artillery in order to equip those of the Pontoon Train with wheels, it is very desirable that means should be taken to send to Coruna good carriages constructed as proposed by Lieut.-Col. Sir Richard Fletcher for 18 pontoons of the large size, and 20 new pontoons with their carriages."

From this time forward there are frequent references to the Pontoon Train by the Duke, and it is evident from their tenour that it was gradually being brought into good working order.

On June 12th, 1815, six days before the battle of Waterloo, the Duke writes thus from Brussels to the Earl of Mulgrave :—

. . . . "In regard to the pontoons, I should think they ought to belong to the Engineer branch of the service, if they were not driven by Artillery drivers ; that corps* is, however, so very bad in its composition, and it is so difficult to make either men or officers do their duty, that I thought it best to place the pontoon establishment under an Artillery officer, in order that he might take charge of, be responsible for, and

* The Artillery driver Corps was an accessory to the Field Artillery, the officers being of a different and less educated class. These latter officers were eventually abolished, and the drivers amalgamated with the Royal Artillery.

proceed with, the drivers, their officers and horses, as he would have done if he had had a brigade of Artillery under his charge.

"Our pontoon establishment here, however, has been formed by Colonel Smyth, the drivers hired generally by himself or supplied by the Commissary-General, and he appears so well aware that the principal object of all is to take care of the horses, as without good horses a pontoon train cannot be manœuvred at all, that I hope the establishment will go on well."

At the close of the war we find, as given in Jones's "Sieges in Spain," the train at Head-quarters in Paris consisted of:—

Pontoons on carriages	80
Boats on carriages	4
Wheel carriages	4
Flanders wagons	63
Forage carts	8
Office cart	1

Together with 1,118 troop horses.

The general disarmament which took place after the close of the war, and the cry for economy which the shattered state of the national finances evoked, were not long in having their due effect on this as on all the other auxiliary establishments so necessary to maintain the fighting powers of an army. One by one the various transport departments were suppressed, and the mobile powers of the troops sacrificed. The men were still retained as a series of regiments, each admirably drilled as a fighting unit, but all organization as a cohesive force was abandoned. It was not to be expected, when even the massing together of regiments into brigades and divisions was lost sight of, and when there was not a single camp throughout the length and breadth of the land, that the more elaborate details of the various auxiliary branches should be cared for. The Royal Engineers before long sank into the routine of peace service. The men having gone through their course of field-work training at Chatham, were employed throughout the country at their respective trades, and the officers were detailed principally for the ordinary duties of barrack maintenance, or on other even still more civil employments. Things continued thus year by year, becoming more and more fossilized. The few men who, gifted with greater prescience than their neighbours, or who having served in the late war, were in a position to know the dangers of the general carelessness, raised their warning voices in vain. Economy reigned supreme, and all that did not make a show by swelling the numbers of the army, was starved into extinction. That the Corps itself was not without blame for much of the neglect with which its wants were treated, is but too true. Had those who were in authority been

sufficiently persistent, matters would probably not have been permitted to sink into such a complete state of inanition. The spirit of the time was, however, against them, and there was no one strong enough, or self-sacrificing enough, to persevere in the demand for a proper organization.

At the end of forty years, when things were probably pretty nearly at their worst, the bubble burst. The British army found itself once more plunged into a European war, and was hurried to the scene of action in a state of disorganization and incompleteness that soon bore its natural fruit in disaster.

As a fighting weapon it was unrivalled. Once placed in the field of action, all went well. War does not, however, consist merely, or even mainly, of battles, and in all else the British army of 1854-55 was a lamentable failure. As in the days of the Peninsula, so was it in those of the Crimea, and in no branch of the service was the evil more fatally apparent than in the Engineers. The following extracts from the "Journal of the Siege of Sebastopol" will show some of the difficulties encountered :—

"On the landing of the British expeditionary army in the Crimea, the Royal Engineers were unprovided with the means of transport for their material. Independent of the Engineer stores provided for the siege of Sebastopol, and which remained on board until the army reached Balaklava, there was a proportion of intrenching and other tools in charge of the Companies or detachments of Royal Sappers and Miners serving with the several Infantry Divisions. It was at first proposed that these tools should be carried by about 600 men told off from each Division for the purpose." . . . . "The capture of a large number of arabas near the coast at Old Fort, rendered this proceeding unnecessary, and the Quarter-Master General was enabled to allot a sufficient number of vehicles for the conveyance of the very limited supply of Engineer stores that accompanied the army. . . . . This was the only transport at the disposal of the Commanding Royal Engineer, and as it was necessary that the Engineer stores and *matériel* required in the construction of the batteries should be collected in the park prior to the opening of the trenches, it was only by great exertions on the part of the Brigade-Major Tylden that this was done. Nor would it have been possible had not occasional assistance been obtained from the Commissariat, and by the employment of carrying parties of the Line. For the conveyance of many of the stores, the arabas were, from their construction, unfitted, and two pontoon wagons, which formed part of the equipment, were occasionally used to bring up long fascines and timbers. These wagons were horsed by the Royal Artillery. After the month of October the number of arabas fit for travelling decreased rapidly. . . . . At this time the Commissariat also had difficulty to bring up the requisite supplies of provisions for the troops, and this being of paramount importance, the few arabas at the disposal of the Commanding Royal

Engineer were employed in aid of that Department, frequently to the detriment of the siege, for the Engineer parks were left without the stores required to meet the constant demands for repairs to the batteries. In the middle of December the Engineer transport was in a most deplorable condition."

And again in a memo. by Sir H. D. Jones, R.E., he states :—

"The Engineers experienced very much the want of a field equipment, horsed similar to batteries of Artillery. Had such an establishment been formed, many of the difficulties experienced in getting materials from Balaklava to the parks would not have been occasioned, as the horses of the Brigades could then have been most usefully employed in bringing forward the gabions and platforms, which were left at the railway station to be conveyed to the front whenever an opportunity presented itself, preference being given to other articles which in the eyes of the authorities appeared more important."

It took some time before these miserable deficiencies and the evils resulting therefrom became thoroughly realized, but by degrees the truth leaked out, and then when too late the authorities began to bestir themselves. Efforts were now made to renew in haste and confusion those branches of the service which had been so long starved. Amongst other matters the question of store equipment of the Royal Engineers and the transport thereof was again brought into prominence. The difficulties that had been encountered in moving the necessary siege *matériel* over those notorious nine miles which lay between our Balaklava base and the front, the tedious and fatal delays that had arisen therefrom, and the sacrifices which those delays had caused, at length made clear to the meanest capacity what should have been long before insisted on by those who knew. The fiat went forth, therefore, to supply a mounted branch to the Corps. The intention was that the troop to be organized should be employed in the care and transport of field stores for the Engineer service, and that when the army moved from its position in front of Sebastopol a pontoon bridge equipment should be developed therefrom. The officer selected to raise and command the force was Captain Siborne, R.E. He lost no time in bringing together a body of 5 Officers, 130 Non-commissioned Officers and men, with 120 horses. The force was at first called the 23rd or Driver Company of the Royal Sappers and Miners, but the title was soon afterwards changed to that of the A Troop Royal Engineer Train.

At the head of this hastily formed body Siborne was promptly embarked for the seat of war. No preliminary training that was worthy of the name had been, or indeed could have been given before leaving England. The troop was imperatively required for immediate service, and the organization, which under a more

far-seeing *régime* should have been the slow and steady development of years, was to be learnt on the field of action. What the results would probably have been may be conjectured. The machine would naturally have exhibited the evil effects of hasty and untrained effort. Many would have been the failures, some possibly leading to actual disaster, but in the long run, as had been the case in the Peninsula, the lesson would have been learnt, and the Corps equipment brought into good working order. All this, however, was not to be. The war ended, peace was proclaimed in the spring of 1856, before the troop had got farther than Scutari, and they were recalled with the rest of the army during that summer.

It would have been imagined that by this time experience had been gained, and that the opportunity would now have been gladly embraced to develop in peace and at leisure what had been so lately proved to be vitally necessary. But it was not so. Once more apathy and neglect fell upon the Corps, and no move was made. The troop with its men, horses and wagons, but without any proper establishment of stores, was sent to Aldershot to be employed in transport duties, and was left to sink or swim as circumstances might direct. What made this neglect the more glaring was that a very admirable attempt at a proper Engineer equipment had been worked out by Major Stokes, R.E., as the Commanding Royal Engineer of the Turkish Contingent.*

In the month of April, 1855, the Minister for War, Lord Panmure, had directed Major Stokes to organize an Engineer force for the Turkish Contingent, and to prepare an equipment suitable for a body of 20,000 men to be treated as a *Corps d'Armée* of two divisions of Infantry, one of Cavalry, and one of Artillery.

Having nothing whatever to guide him, Major Stokes set about the creation of this Engineer force. The only portion which is connected with the subject now under discussion was the Train with its equipment This was to consist of two troops under an English commandant, the drivers being Wallachians officered by their own countrymen. The train was, however, intended only as a transport corps for the conveyance of *matériel*, the actual working devolving on the Sapper Companies. Each infantry division was to have two Companies of Engineers attached to it, one for field service, the other for pontooning. To each Company, therefore, were attached either 12 wagons for intrenching tools or 16 wagons for pontoons, in all cases there being in addition

* A full description of the equipment is given in the "Professional Papers of the Corps of Royal Engineers," vol. viii. pp. 151 to 171.

3 store carts. There was also a train of 40 horses with pack saddles and leather panniers, in which light tools and stores could be carried.

The tools were divided under three heads, viz., Intrenching tools, Artificers' tools, and Miscellaneous stores.

The Intrenching tools were fixed as follows:—5,000 pickaxes, 5,000 spades and shovels, 500 felling axes, and 500 hand axes.

The Artificers' tools were allotted in chests as under, viz., carpenters, 22; smiths and tinmen, 7; sawyers, 5; masons and bricklayers, 10; miners, 6; coopers, 5; collarmakers and shoemakers, 7; well-sinkers, 3; armourers, 5; farriers, 11.

The Miscellaneous store list is too numerous to be detailed here. It was compiled with great care and showed much discrimination in the selection.

The Pontoon train comprised two bridges of Blanshard's large pontoons, each bridge being formed of sixteen rafts or thirty-two pontoons. There were also attached ten india-rubber boats.

This mass of *matériel* was returned to England at the close of the war, and became absorbed in the heterogeneous accumulation which had been collected, and was now made away with as rapidly as possible. The School of Military Engineering at Chatham took the greater portion of the stores, so carefully got together by Stokes; complaints were made, as was but natural, at the inferior character of some which had been supplied by the contractors at express speed, but no one seems to have regarded it worthy of a thought to use the list which had been compiled by Stokes, either as a basis for a permanent Engineer field park, or even for criticism with a view to the preparation of one of a more serviceable kind.

Everything having been left in a chaotic state at the conclusion of the war, Siborne found himself placed in a position in his new quarters where it was most difficult for him to show the *raison d'être* of his corps. He was hampered in all his efforts by the stern refusal of the authorities to undertake any outlay on its behalf. Had the command at this time been in weaker hands all would have been lost. Fortunately, Siborne was not a man to acquiesce quietly in suppression, and limited as were his means he contrived to show a brave front and to convert his troop into something more than a mere ordinary transport corps. It was at this time that the use of the lasso was introduced. This novel mode of applying horse-power for traction purposes in positions where the ordinary method of draught became impossible, was carried by Siborne to a high pitch of perfection, and formed an important and attractive part of the mounted Engineer training.

In establishing this instruction, however, he met with much discouragement and many rebuffs. At a time when it was extremely difficult to extract from the Treasury the sums actually necessary for the vital requirements of the army, the Quartermaster-General's department cast a wishful and longing eye upon the pitiful amount allotted to the maintenance of the Engineer Troop. Why, it was argued, keep up a body of special Engineer transport manned by Sappers, to do work which could be as well and more economically performed by an ordinary transport corps. The troop was, it must be admitted, in just the position to arouse such a criticism. Not sufficiently organized and equipped to show its capacities for special Engineer duties, it was no doubt, as was pointed out by its enemies, too expensive for ordinary transport work. It was bound either to develop itself or to be crushed.

Whilst matters were on this unsatisfactory footing, Captain Siborne was, in 1860, removed from his command, having been selected as one of the officers to carry out the details of the scheme brought forward by the Commission on National Defences for the fortification of our dockyards and arsenals. His place at the head of the Troop was given to Captain Duff, and this officer bravely continued the struggle that had been so stubbornly carried on by his predecessor. Matters gradually grew worse and worse. A Committee was appointed, of which Sir G. Wetherall, the Adjutant-General, was President, to consider the question of the "Supply and Transport of Ammunition and Stores for an Army in the Field." This Committee, in their original report, proposed to suppress the Troop, and to call upon the Military Train to perform all the transport duties of the Engineer Field Train. A draft of this report was submitted to Sir John Burgoyne, the Inspector-General of Fortifications, and to Colonel Frederick Chapman, the Deputy Adjutant-General Royal Engineers. Both of these officers protested in the strongest manner against the scheme.

Sir John, in his memo., remarked :—

"By such a system the Engineer Field Train will never be efficient. Everything will have to be *organized* for this especial service when the army is taking the field, and when in many cases there will not be time for it. With an Engineer Train the drivers are, by instructions, and being of one corps, enabled to co-operate with the engineering soldiers, or even act without them, in many engineering proceedings, such as pontooning, &c. By being dependent on the Military Train, the Engineer service will be competing with the other heavy demands on that body, and means of transport being the great want in all armies, supply of provisions, forage, ammunition, and other items considered to be of primary necessity will naturally be preferred, and the Engineer

Field Equipment will be neglected and reduced quite beneath its requirements . . . ."

Colonel Chapman, in a lengthy paper, observed on this point :—

"From the proposition contained in Art. 73, I beg leave altogether to dissent, and to remark that had any Officer of Engineers who has experienced the want of a Special Transport in the field been examined on this point, I think the Committee might have hesitated before recommending, on the score of 'simplicity,' the substitution of Military Train Transport for that of the Engineers. Simplicity is best obtained among 'special corps,' by obliging each to carry out, as far as possible, its own immediate details, and it would be about as reasonable to transport Artillery guns and ammunition by Military Train, keeping the gun detachments as combatants, as to horse and drive the Engineer Equipment and Pontoon Train in the manner proposed . . . ."

To these memoranda Colonel The Hon. Percy Herbert, the Deputy Quartermaster-General, replied, urging the arguments which had led the Committee to decide on recommending the abolition of the Troop. When, however, the matter came to be once more discussed by the Committee, they were evidently somewhat shaken in their views, for in place of the positive and definite recommendation of the first draft the revised report ran thus :—

"In considering the topics connected with the Engineer Department, the Committee were of opinion that it would tend to the simplification of transport arrangements if the services of the Engineer Field Train were performed by the Military Train, by attaching to the Commanding Royal Engineer such a portion of the Military Train as might be sufficient for the duty, and thus do away with the horses and drivers at present attached to the Engineer Train. This proposition, however, has been objected to by the Inspector-General of Fortifications, Sir John Burgoyne, and by Colonel Chapman, D. A. Genl. of R. Engrs. On the receipt of these objections Colonel Chapman was requested to confer with the Committee, but the discussion terminated without resulting in an agreement of opinion. As the arguments in behalf of continuing the existing Engineer Field Train for the exclusive use of that branch of the service, and independently of the general transport of the army, are amply expressed in the letters of Sir John Burgoyne and Colonel Chapman, and as the views of the Committee are satisfactorily explained in the Memo. from the D. Q. M. Genl. Colonel the Hon. Percy Herbert, the Committee beg leave to refer to those documents for a full exposition of the opinions on both sides of the question, and submit the subject to the decision of the Secretary of State for War and the General Commanding in Chief."

This was, at all events, somewhat better than the draft proposal. Although the Committee still adhered to their views they did not place their recommendation in so positively destructive a form.

Fortunately for the Corps events were looming, which entirely altered the aspect of affairs. The report was signed on March 28th, 1862, and before that date the dispute with America, so well known as the Trent affair, had broken out, and an expeditionary force was got together to be despatched in hot haste to Canada. It is to this event that we may trace the rescue of the Troop, and its rapid development into a real Engineer Train.

To Lord de Grey,* the then Parliamentary Under-Secretary of State for War, the credit belongs of having been the first amongst the men in authority to grasp the necessity for such a corps, and for having quietly and unostentatiously, but very efficiently, pushed its claims in the teeth of a most obstinate resistance.

The question was first mooted by calling for a report as to whether the Pontoon equipment shown amongst the war *matériel* in store at Woolwich Arsenal, and of which a list had been submitted to the Secretary of State, was complete "in all its details, and ready for immediate shipment" with the expeditionary force. The inspection devolved on Captain Duff, and he was compelled, after careful examination, to report that there was no really efficient Pontoon train ready for service. The store, which was of pontoons of the Blanshard cylindrical pattern, had originally been formed at the instance of the designer, Colonel Blanshard, R.E. It had, however, never been made complete, and after Blanshard's death no one appears to have taken any interest in the matter. Demands made for instruction purposes at Chatham and Sandhurst had been met by issues from this store, the stock in hand being kept up by fresh manufacture, no one apparently qualified for the purpose being employed in the reception of the articles to see that they were correct and of a homogeneous pattern. It is doubtful whether any of the authorities at the head of the Corps were aware of the existence of this small instalment of their war requirements until they were called on to name an officer to undertake its inspection. Thus confusion had occurred, there were many defects and deficiencies, and some portions of the bridge would not fit together. The pontoons themselves had, moreover, become so deteriorated from age that but few of them were sufficiently sound for service.

The immediate consequence of Duff's report was the condemnation of the greater portion of the equipment. At the same time a committee was appointed, consisting of the Chief Storekeeper, the Superintendent of the Carriage Department, and himself, to draw up a complete list of the stores necessary for a bridge train. Here was the lever required to stir the inert mass, and Duff soon

* Earl de Grey and Ripon, afterwards Marquis of Ripon.

set it in motion. The report of his committee on bridge stores afforded an opportunity for pointing out that an efficient pontoon train required an organization of men and horses as well as of *matériel*, and of this he was not slow to take advantage. Enlarging on this text, he drew up a statement of the incomplete and chaotic system of the field stores generally and of the inefficiency of the troop under his command for the purposes for which it had been raised. Rightly regarding the continued existence of his troop as affording the only possible prospect of the eventual development of an efficient Pontoon and Field Equipment Train, he sought to put this view of the case to the Secretary of State before the order for its abolition should be actually given, and with this object he was successful in getting his statement laid privately before Lord de Grey.

The date of this paper was August 14th, 1862, and eight days later we find Lord de Grey appealing to Sir John Burgoyne for his views on the subject.

These, after calling for reports from Colonel, afterwards Sir Lintorn Simmons, then Commanding Royal Engineer at Aldershot, and Captain Siborne, Sir John gave—both personally and in writing. The result was that Lord de Grey had his hands sufficiently strengthened to enable him to push the matter through. Sir John's memo. on the subject is so important that no apology is necessary for giving it here *in extenso*. It is dated November 16th, 1862:—

"PROPOSED ROYAL ENGINEER FIELD AND PONTOON TRAIN.

"Memo.

"Among the many matters of noted imperfect organisation of the British Army for the field, is that of the Engineer service.

"It is not so glaring nor so prominently observed in this department as in the Commissariat, Medical, and Store branches; but it is, nevertheless, of great importance.

"The Engineer duties in the field are incessant, and on the rapid and efficient performance of many, very great results may be dependent in a campaign. To mention one as an example:—Had there been Engineer means on only a moderate scale with the army before Burgos, we should have undoubtedly taken that place instead of spending six weeks before it, to end in failure.

"It could readily be shewn that all through our last wars, great advantages would have been obtained had we possessed such an Engineer equipment, as forms part of all the best composed continental armies.

"There is so great a repugnance in England to the constant maintenance of what are deemed large military establishments, that it has been the practice, after every war, absolutely to reduce altogether all the accessory branches; to preserve a certain amount of well-equipped soldiers of the different arms, and to leave to the breaking out of the war every other necessary branch, which by this system has not only then to be created,

but to be devised and experimented upon, while all the imperfections attendant upon learning the business are severely felt during the early operations.

"This great evil would be much lessened by having a basis or model establishment even on a small scale, but thoroughly organised and understood, and then extension alone would be needed.

"The Engineer service comprehends all the preparations for the atttack and defence of posts and positions, construction or improvement of military roads and communications, pontoons and bridging of all kinds, mining, destruction of bridges when necessary, repairs and adaptation of buildings to purposes of hospitals, stores, &c., construction of temporary wharves and piers, surveying and reconnoitring, the preparation of field telegraphs, &c. &c.; all these require certain sets of tools and implements, packed and arranged for transport in a peculiar manner by a fixed establishment of horses, carriages, or pack saddles, drivers, and men instructed in the whole system to ensure its entire efficiency on an advantageous principle.

"The pontoons in particular require a distinct train with a certain set of men well instructed in the care and completeness of every part for preservation and travelling, and with a thorough knowledge of its management and manœuvres to and from and in the water.

"At present we have but one troop of 120 horses and proportion of drivers for all these services, and those imperfectly organised. It is not sufficient even for learning and establishing what is necessary as a model.

"I strongly recommend then that the Engineer Train should have an additional troop, that is one troop for the Engineer field equipment of intrenching tools with mining and other artificers' stores, and one as a pontoon train; these would form respectively an unit of each branch, which could be multiplied to any extent required to meet the emergency of war or any necessary preparations.

"Accompanying are tabular lists of the establishments that would be thus constantly maintained in officers, men, horses, carriages, and implements. The cost for men and horses would be that of so many in the Artillery service, and would be lessened by a considerable return for the outlay in the habitual application of these trains in ordinary times for four days in the week to the Engineer transport on the works, to the saving of the expense of so much transport by contract, by which proceeding the horses of the existing troop effected a saving during the last year of £1,333. "Sd. J. F. BURGOYNE,

"I.G.F."

The tabular lists referred to recommended an establishment of two Captains and six Lieutenants Royal Engineers, 434 Non-commissioned Officers and men, ten Officers' horses, and 302 Troop horses, with the necessary equipment of Pontoons and Field Train. There was also proposed a Depôt detachment for the two Troops, consisting of two Officers, five Non-commissioned Officers, and five Troop horses.

It is clear that even before this able paper was laid before him, Lord de Grey had made up his mind that the recommendation of the Committee to abolish the Royal Engineer Troop was a mistake. The paper was dated November 6th, 1862, and two days before that, viz., on November 4th, the Secretary of State for War had approved of the recommendations of the Committee "with the exception of those relating to . . . . the Engineer Field Train." Duff's paper of August 14th probably saved the Troop, but it was left for Sir John Burgoyne to drive the matter to its legitimate conclusion. His paper, and the report of the Committee on Pontoon equipment, were in due course referred to the finance branch for an estimate of cost. The amount involved was objected to, as might have been expected, and the matter referred back for the free use of the pruning knife. The first idea was to reduce the unit of length of bridge from 100 yards to 50 yards, and Sir J. Burgoyne was asked for his views as to this change. These he gave as follows :—

"The proposition to fix the unit for the pontoon train at 100 yards of bridge was made because that length will admit of a more economical distribution of officers and men than any other proportion of the bridge that can be taken."

"The principle that governs the selection of an unit is, to obtain the greatest possible results in length of bridge that will not give too many horses and drivers for a Captain's charge, because within certain limits the same number of pontoniers are necessary to work a small bridge as a large one. An equal number of pontoniers are necessary for the working of a bridge of 50 yards as for one of 100 yards, and discipline requires an equal number of officers, and almost an equal number of non-commissioned officers, it being impossible to apportion the duties properly among a smaller number."

"The only saving, therefore, obtained by substituting 50 yards of bridge for 100 yards is in the horses and drivers, and the reduction in their number does not amount to nearly one half, for there are several single carriages, such as artificers' wagon, forge wagon, spare pontoon or landing bay wagon, store cart, &c., which are equally necessary for a short bridge as for a long one."

"Moreover, there are great disadvantages attending the reduction of the unit proposed, or the taking a portion of it to work with. The unit of 100 yards being the most economical one that can be chosen, we should from necessity come to that on service or on any preparation for service requiring a pontoon train on a large scale. The cause of much failure is the plan of working in time of peace upon a system of responsibility and distribution of duty which has to be overthrown and changed when the moment for action arrives ; the confusion of the change is not confined to ourselves alone, but extends also to the officers of the Store Dept., who must be perfectly acquainted from actual experience with the details of our arrangements and the proportions of our stores, in

order to enable them to supply us with our equipment on service without delay or misunderstanding. I therefore do not recommend a reduction of the unit, nor that half an unit be taken to commence with."

"I propose that the whole unit of bridge equipment be issued, that the establishment of bridge stores be fixed, printed, and regularly accounted for by the officer in charge; but, as a makeshift for economy, I suggest that the unit be only partly horsed, the harness of the remaining horses and the personal equipment of their drivers being the only stores withheld."

"By this arrangement the system of instruction and division of responsibility will be interfered with less than by any other plan for economy that can be devised."

"A similar argument holds good for the unit of field equipment, and I would propose to withhold temporarily from each of the two units, 48 draught horses, 25 drivers, and 1 shoeing smith," &c., &c.

"Sd. J. F. BURGOYNE,
"I.G.F."

In spite, however, of all that had been done and of this letter, the War Office economists were able for some time longer to hold out and prevent action being taken. Curiously enough, at this critical juncture, a Committee of the United States Senate was sitting at Washington to inquire into the cause of the disaster attending the passage of the Rappahannock and the battle of Fredericksburg, on December 13th, 1862, which had involved the loss of 10,000 men of the Federal army in killed, wounded, and missing. At this Committee, the evidence of General Franklin was taken, who said:—

"I would like to impress as firmly upon the Committee, as it is impressed upon my mind, the fact that this whole disaster has resulted from the delay in the arrival of the pontoon bridges. Whoever is responsible for that delay, is responsible for all the disasters which have followed."

The Committee in their report stated:—

"But why did Burnside remain so long on the wrong side of the river? Because the promised pontoons were not in readiness for him, and to the default of some officer or some department in this matter the entire disaster is ascribed. On this point the Federal generals are unanimous."

Such a report following upon such a disaster enabled those who were urging the creation of a proper Engineer Train to bear down all opposition, and at length the order was given to develop the existing "A" Troop into a Pontoon Troop, and to add to it a "B," or Field equipment Troop, with a Depôt detachment available for both.

The following memo. shows what was decided upon :—

"Horse Guards, 22nd May, 1863.

"Memo. for the C. R. Engr., Aldershot.

"The formation of an additional Troop of Royal Engineer Train, with a Depôt detachment to maintain both Troops, having been ordered under War Office letter of the 5th May, 1863, No. $\frac{6\,8\,4\,8}{4\,0\,2}$ and Aldershot having been selected by His Royal Highness The Field Marshal Commanding-in-Chief as the station at which this Establishment is to be organized, the accompanying memoranda on the subject, together with Tables showing the numbers authorized, are forwarded for the information and guidance of Colonel Simmons, C.B., C.R.Engr., at Aldershot, under whose orders and superintendence the Engineer Train will be formed.

"In carrying out the views expressed in the enclosed memoranda, the necessary arrangements are to be made to admit of either Troop being separated when necessary from the Depôt detachment; with this object the equipment and stores of the two troops are to be kept and accounted for separately.

"The duties in connection with the charge of stores, payment, and interior economy of each troop will, of course, be conducted by their respective Captains, &c. &c.

"By Command,

"(Sd.) F. E. CHAPMAN, Col.,

"D.A.Genl. Royal Engrs."

When formed with the reduced number of horses, which had been reluctantly consented to by Sir John Burgoyne, in order to diminish the cost, the Pontoon Troop consisted of 1 Captain, 3 Lieutenants, 207 Non-commissioned Officers, Sappers, and Drivers, with 5 Officers' horses, 12 Troop riding, and 80 draught horses.

The Bridge equipment consisted of 24 heavy pontoons, of a pattern designed by Admiral Caffin,* as an improvement on Blanshard's, 154 baulks, 128 whole and 52 half chesses, 25 pontoon saddles, 25 outriggers, 27 anchors, 97 oars, 29 buoys, and 1 boat, with the necessary complement of minor stores.

The establishment of carriages was as under :—

12 heavy pontoon wagons,
1 spare „ „ (carrying extra wheels),
3 general service „
1 forge „
1 boat „
1 artificers' „
1 store cart (carrying surveying instruments, &c.).

* Admiral, afterwards Sir J. C. Caffin, was at the time Director of Naval and Military Stores at the War Office.

With these was supplied a provision of spare carriage stores, such as axle trees, splinter bars, linch pins, shafts, swingletrees, &c. &c.

The following tools were part of the equipment, viz. :—

3 Carpenters' chests complete,
3 Collar-makers' ,, ,,
3 Farriers' ,, ,,
3 Painters' ,, ,,
1 Smiths' ,, ,,
3 Tinsmiths' ,, ,,
1 Wheelers' ,, ,,

with a large supply of loose tools and mathematical and drawing implements, books, stationery, &c. &c.

The B, or Field Equipment Troop, consisted of 1 Captain, 3 Lieutenants, 191 Non-commissioned officers, Sappers and Drivers; 5 Officers' horses, 16 Troop riding and 78 draught horses, with 20 pack horses.

The carriages were as under:—

3 forge carts,
4 store carts,
15 tip carts,
3 artificers' wagons,
6 general service wagons,
1 forge wagon,
1 miners' wagon,

with a due proportion of carriage stores, similar to that for the Pontoon Troop.

The artificers' equipment included 15 sets of carpenters' tools and 2 sets of wheelers' tools, with a large assortment of extra saws and hammers; 8 sets of collar-makers' tools, 7 of farriers', 1 of coopers', 1 of bricklayers' and masons', 7 of miners', 4 of smiths', and 3 pack saddle forges. The intrenching tools comprised 570 each of picks and shovels, 70 spades, 50 rammers, with 125 felling axes; 120 hand hatchets, 160 bill-hooks, 70 reaping hooks, 100 gabion knives, 1,500 sand bags, 200 fathoms of Bickford's fuze, powder, hose, and a number of miscellaneous tools, with nails, screws and other materials. To secure mobility, a proportion of the tools, &c., were arranged in two-wheel carts and on pack horses, the total load for the latter ranging from 233 to 279 lbs., including the pack saddle. The French plan of slinging the picks and shovels on the pack saddles by means of light iron "ellipses" was adopted.

Captain Duff was appointed to take command of the revised and augmented Train, with Lieutenant Haslett as Adjutant The command of the A or Pontoon Troop was given to Captain

Marindin, and that of the B or Field Equipment Troop to Captain Dawson (afterwards Dawson-Scott).

The principle upon which the Field Equipment Troop was based was that it should carry the advanced equipment of the Royal Engineers. This embraced the tools and field stores for three Companies, and a Field Park, the latter to be attached to Head-quarters, such having been taken as the proportion of the Engineer arm to be allotted to a force of 10,000 men. The Troop was, therefore, organized in four parts, each complete in itself. Three of these parts, called sections, were identically similar, each being ready to be attached to a Company. The fourth part, or Field Park, conveyed the heavier stores necessarily with the Corps, but in less constant requisition than those with the Companies.

The victory was now gained, all opposition was overborne, and it only remained for the officers who were placed in charge of the reorganized train to show that no mistake had been made. Everyone exerted himself to the utmost, and in an almost incredibly short space of time the Troops were in a state to take their position in line at the field days of the Aldershot division. Here they were the subject of much interest and curiosity, and excited universal admiration by the perfection of their training, the apparent completeness of their equipment, and the novelty of their general appearance.

In the following year, 1864, Lord de Grey who, on the death of Sir George Lewis, had succeeded to the position of War Minister, directed provision to be made in the Army Estimates for completing the two troops to the full proportion of horses and drivers, as originally recommended by Sir John Burgoyne. The numbers then stood :—

A Troop.

4 Officers, 217 Non-commissioned Officers and men, 5 Officers' horses, 16 Troop riding and 124 draught horses.

B Troop.

4 Officers, 217 Non-commissioned Officers and men, 5 Officers' horses, 20 Troop riding, 112 draught, and 30 pack horses.

The Depôt also received an augumentation of 33 Non-commissioned Officers and men.

All now went comparatively smoothly. Those who had been the most strenuous in opposing the creation of the force, as well as those who had been coldly neutral, were equally ready to admit that the advocates of the measure had been in the right, and that the money expended in the creation of the Train had been well

laid out. But notwithstanding the general success of the new force there was much yet remaining to be done. The evil worked by the neglect of half a century could not be swept away at the word of the War Minister. It was felt by the officers that the goal was not yet reached, and that the equipment devised with such contracted opportunities for experiment, was not in all points capable of bearing the test to which it would necessarily be subjected on active service. Among other defects the want of buoyancy of the cylindrical metal pontoons, as well as their unsteadiness when in bridge, gave cause for much anxiety. These evils had been only discovered now that the more extended practice afforded with the co-operation of all arms of the service subjected them to severer trials than they had previously borne.

This and other weak points led to the nomination of Captain Duff as a member of the Engineer Committee on Inventions, in order that such improvements in the equipment might be determined on as should be considered advisable to remedy the evils with which he was well acquainted. He was instructed to bring under the consideration of the Committee every article which had been experimentally introduced into the train. Under this arrangement, by which the ideas and inventive powers of some of the most practical minds in the Corps were brought to bear on the subject, the necessary improvements in the equipment were gradually and satisfactorily brought about.

The most important change thus effected was the substitution of the boat pontoon for the existing cylindrical one. This was effected principally by the efforts of Colonel Simmons, who, whilst Commanding Royal Engineer at Aldershot, had had full opportunity of noting the faults of the latter. He was now the President of the Engineer Committee, and as Commandant of the School of Military Engineering, had applied the abilities of his officers and the resources of the instructional workshops of the Corps to remedy the evil. The result was the boat pontoon, designed after careful consideration of the merits and defects of those of continental armies. This pattern was adopted after extended and exhaustive trial, and still remains unsurpassed in its general advantages. Its buoyancy is such that a bridge formed with it is able to support not only the passage of loaded elephants and siege guns, but even of military traction engines.*

* A few of the Blanshard's Infantry Pontoons still remained in store, and were not condemned, although they were looked upon as little better than toys. It will be seen further on that they were issued to the Troop when proceeding on the Egyptian Expedition of 1882, and that they proved a sad failure. It is to be hoped that we have now heard the last of them.

These improvements having been all effected, the Corps sought fresh opportunities of development, and there were those amongst its members who yearned for a closer approach to the admirable organization of the Engineer Corps in the leading continental armies by a further extension of the system. Some years previously a scheme of field signalling had been introduced into the army. This had been created and practised at the Chatham School of Military Engineering, and was accepted as a most useful adjunct to military operations. In every regiment a corps of signallers had been formed, and whenever an occasion offered, their services were called into requisition to aid in the carrying out of extended field manœuvres.* Good as this system was, it by no means furnished a completely adequate method of communication, and on many occasions broke down from causes beyond the control of those who were engaged in its establishment and perfection.

That an army in the field would be much aided by a more sure, complete, and expeditious method of keeping in touch with its various component parts and with its base, was apparent. Quietly, therefore, and unostentatiously, the lines were laid down on the basis of which an electric field telegraph system should be created to supplement the existing code of visual signals, and to render facilities for communication in places where the latter was inefficient or impracticable.

It was, however, felt that any attempt to establish such a branch of the Corps at the time would necessarily fail. So much had already been done that it was most unadvisable to seek to incur further expenditure in the increase of the Train. Still the matter was not allowed to sleep, and everything was steadily and quietly prepared in readiness to seize the first favourable opportunity for action.

Eventually the looked-for moment arrived. The sudden and unexpected breaking out of the war between Germany and France, in the summer of 1870, naturally excited the alarm of the British Government. Orders were therefore promptly issued to the naval and military authorities to place everything in their respective departments on a footing for immediate action, in case the necessity should arise, a large vote of credit being asked for and obtained from Parliament to defray the cost. Here was the opportunity that had been waited for. The details of the scheme

* In the description of the Abyssinian Campaign, in Chap. XXII. Part I., mention has been made of the great use of flag signalling, as carried out by the men trained at Chatham, and sent for the purpose with the expeditionary forces.

for the addition of a Telegraph Troop to the Royal Engineer Field Train were sufficiently worked out for the purpose, and a claim was at once put forward for its establishment. This was sanctioned without any of the weary delay and captious opposition that had attended the formation of the existing Troops. With the warm approval of all concerned, the word was given to form the C or Telegraph Troop. The following regimental order was issued on the occasion, dated Horse Guards, August 26th, 1870:—

"C. R. E., Aldershot.

"With reference to special Army circular, dated 24th inst., will you have the goodness to inform the Officer Commanding the R. E. Train that the Establishment of the Troops is to be as stated in the accompanying Return.

"The C Troop is to be formed at Chatham from the 1st proximo, inclusive, and it is intended at present only to raise it to the strength stated in Red Ink on the Return.

"The Officer Commanding R. E. Train is to be directed to submit the necessary promotions and transfers, and before doing so, to place himself in communication with the Commandant S. R. E., Chatham, in order to ascertain the names of the N. C. O's. and men, and the horses that Officer is desirous of having transferred to the C Troop.

"Lieutenant Tisdal's section of B Troop, will form the nucleus of C Troop.

"Sd. H. Fane Keane,
"D. A. General."

Captain Montague Lambert was appointed to take command of the new Troop, Captain Home, R.E., then Secretary to the Royal Engineer Committee, having been the officer chiefly concerned in its origination.

The Establishment at first authorized consisted of 1 Captain, 4 Lieutenants, 245 Non-commissioned Officers and men, and 55 horses. This brought up the total strength of the Train to 16 Officers, 718 Non-commissioned Officers and men, and 362 horses.

The *matériel* of the Troop consisted of twenty-four carriages, viz.:—

4 office wagons,
12 wire wagons,
3 general service wagons,
1 pontoon wagon,
1 forge wagon,
3 artificers' wagons.

The office wagons contained the instruments, writing materials, &c. The pontoon wagon carried a bay of superstructure and a

pontoon boat, the former for crossing a small opening, and the latter for putting the cable across a river. Each wire wagon had six drums, and carried three miles of insulated wire. The Troop was designed to constitute a unit of the branch, for service with a *Corps d'Armée*.

It was rapidly developed to its proper strength, and in 1871 its horses were increased to the number of 115.

The formation of this third troop raised the strength of the Train to such an extent that it was considered by H.R.H. the Field Marshal Commanding-in-Chief to be inconsistent with the spirit of the regulations that a force which exceeded in numbers that of a regiment should remain under the command of a Captain only. This difficulty became the more marked as it was proposed to assemble the three troops for summer drill and manœuvres in the neighbourhood of Aldershot in 1871. At the same time it was thoroughly realized that Duff had throughout these eventful years been the main motive power to bring the Train into its then advanced state of organization, and it was with extreme reluctance and after much deliberation that any change was made. At length, however, the step was taken, and from January 3rd, 1871, the command was transferred to Lieutenant-Colonel Fitzroy Somerset, R.E. By a letter from the Horse Guards the Commanding Royal Engineer at Aldershot was requested "to communicate to Captain Duff the approbation of His Royal Highness for the valuable services he had rendered." Arrangements were made to retain him on the Royal Engineer Committee, where his great experience of Train details was found most valuable.

Meanwhile the A and B Troops continued to increase the estimation which they had already gained in the opinion of the authorities. With a view to take advantage of the new organization, sections of the B Troop were attached to the Companies of Engineers stationed at Shorncliffe and at the Curragh, whereby not only the utility of those Companies for the works at their respective stations was enlarged, but their readiness to meet a sudden call for field service was made obvious.

As a proof of the progress made by the A Troop the following account of the operation of throwing a pontoon bridge across the Thames from Windsor to Datchet, before the Queen, on the occasion of the review held on June 24th, 1872, at which the Shah of Persia was present, may be quoted. It is interesting as showing how by that time the Troop had become thoroughly trained in its duties, and able to carry on bridging work with the utmost certainty, safety, and promptitude. It is taken from the "Royal Engineer Journal."

"The troop marched out of Chatham on the 19th June, and encamping at Woolwich, Wimbledon, and Hounslow on the road, reached Windsor on the 23rd June, and encamped in the Great Park. An inspection of the river was made the same afternoon, and a ramp cut on the Windsor side, where a bank sloping at an angle of 45° and about 7 feet in height was found to exist. On the opposite (the Datchet) side the water shoaled so gradually that pontoons could not be used within 20 feet of the shore, and a pier of fascines and wooden stakes, about 12 feet wide and 10 feet long, was constructed to obviate this difficulty.

"Her Majesty the Queen having expressed her intention of being present during the operation of making the bridge, the troop was halted in column of subdivisions at 10.30 a.m. on the 24th of June on the road leading to the river, the leading wagon being close to the point from which the bridge was to be 'boomed out.' On the arrival of Her Majesty the command 'In Double Time Boom Out Bridge' was given, and the unpacking proceeding simultaneously with the booming out the bridge was completed in exactly 22 minutes. The time given includes about 4 minutes taken up by the construction and making up for the passage of wheel traffic, of the shore and landing bays of the bridge; a slight delay occurring owing to the difficulty in finding good holding for the pickets of the shore transom in the fascine pier on the Datchet side. It was found that the unpacking of the wagons scarcely kept pace with the booming out, and for a short time stores, especially saddles, were not forthcoming quite so rapidly as they could have been used. This may partially be accounted for by the fact that the ground was somewhat unfavourable, the place for launching pontoons being steep and narrow, and great care being necessary to prevent the pontoons being stove in by old piles and stakes with which the bed of the river was studded. The whole of the men worked with great zeal, and many, especially among the unpacking detachments, were much exhausted at the conclusion of the operation.

"The Thames is 250 feet wide at the spot where the bridge was made. Eighteen wagons were unpacked, fifteen pontoons being used in bridge, two as anchor boats and one as a spare pontoon. The bridge was held in position by 14 anchors, 7 up and 7 down stream, the centre anchor on either side being 112 lbs. in weight, and the remaining anchors 56 lbs. The bridge was crossed about midday by five battalions of Guards with mounted officers complete, and recrossed in the evening by the same number of troops. No casualty occurred, and beyond a very slight oscillation the bridge was perfectly steady.

"A bridge guard of one man to each pontoon was detailed to take charge of the bridge, and an officer was present at each end while the troops were crossing.

"After the passage of the Guards in the evening a cut in the bridge was made to reopen the traffic on the river, which had been stopped throughout the day. The cut was 45 feet in width, and was made by disconnecting one raft complete, and dropping it down stream behind the standing part of the bridge.

"On the 25th June the troop marched from their camp to the river for the purpose of taking up the bridge, and at the moment of arrival Her Majesty drove up to witness the operation. The visit was entirely unexpected, and no preparation had been made for it. Owing to the steepness of the bank special arrangements had to be made for getting the pontoons on shore, and on this account they were left in the water until the bridge had been 'boomed in' and then hauled out of the water and packed four simultaneously, the packing of the other bridge stores having been completed during the booming in. The whole operation, from the arrival of Her Majesty until the troop was ready to march off the ground, occupied 34 minutes, and considering the difficulties of the ground, and the fact that the ends of the bridge were strongly picketed and made up, and the troop taken by surprise, the time appears exceedingly good. The work was, comparatively speaking, even more quickly and better done than on the preceding day, and it is doubtful whether under the circumstances the time could possibly be improved upon.

"The Queen personally expressed to the Officer Commanding the Troop great interest in the operations witnessed, appreciation of the zeal with which all had worked, and Her Majesty's entire satisfaction at the results.

"No article of bridge equipment was lost, broken, or damaged during the operation.

"The strength of the troop at Windsor was 1 Captain, 3 Subalterns, 232 N.C. Officers and men, 173 horses, and 32 wagons."

The next change in the organization of the Train arose from the formation of Field Companies, and the attachment thereto of sections of the B Troop. The Intelligence Branch at the War Office had gradually worked out, at least on paper, a systematic military organization of the forces of the Kingdom into Army Corps under which the nominal unit of 10,000 infantry, fixed in 1862, had grown into Army Corps of three Divisions each and numbering 36,806 of all ranks. Four Companies of Engineers with their Field Equipment, and one Pontoon Troop, was the proportion of the Engineer arm fixed for an Army Corps. One of these Companies was to be attached to each Division, and the fourth with the Field Park to the Head-quarters.

This organization necessitated a modification of the arrangements under which the B Troop had hitherto been conducted. It was converted into four sections and a Field Park, and the sections were attached permanently to four Companies, which were, for the purpose, converted into Field Companies. Those which were selected for the purpose were the 2nd, the 5th, the 17th, and the 31st. At the same time the Depôt, which had hitherto been commanded by the Adjutant, was amalgamated with the Field Park, and was henceforth called Field Park and Depôt. With a view to economy in horse-power, the

plan of carrying a portion of the equipment in two-wheel carts was abandoned, the proportion of pack horses much reduced, and the number of wagons increased, the equipment for each Field Company being rearranged in loads for six wagons and three pack horses. The stores for the Field Park were arranged in nine wagons, including printing, lithographic, and photographic wagons. Several minor alterations and additions were also made in the list of stores conveyed. This change was effected in December, 1877.

At the same time the command of the Companies R.E. at Aldershot was amalgamated with that of the Train, the officer holding the post being called O.C. Troops and Companies R.E., and the title "Train," which had been adopted at the time of its first formation, was dropped. The Troops and Companies were thenceforward both mustered together under the title of Royal Engineers.

In May, 1884, the C Troop and the two Telegraph Companies (the 22nd and 34th) were amalgamated under the name of "Telegraph Battalion," the C Troop remained unaltered in its organization, and formed the first division of the Telegraph Battalion, and the two Companies the second Division.

In 1885 two more Field Companies were formed, the mounted portions being raised by drafts from all the Troops, and Companies, and Depôt. By this time the title of the B Troop had become completely obliterated.

The following account of the share taken by the A or Pontoon Troop in the action of Tel-el-Kebir, is extracted from a diary kept by Lieutenant Irwin, R.E., during the expedition :—

"Our equipment consisted of 20 service pontoons with superstructure, stores, &c., 4 trestles and superstructure, 10 pontoon carriages, 18 tip carts, 2 water casks, and a forge wagon. The reason we only took 10 pontoon carriages was, that it was expected we should work along the canal, and therefore tow the pontoons instead of dragging them by land."

"Sunday, Sept. 10th, Ismailia. Got up at 4 a.m. The men set to work packing the rafts. The Major started with half the men and horses, and some of the rafts at 7 a.m. He had had a lot of small boats, made out of tarpaulin wagon covers stretched on a light framework, and a lot of these being filled with stores, we took them in tow behind my already too heavily loaded rafts. Misfortunes overtook us from the very beginning. Before starting we found most of these hastily improvised boats half-full of water, so we had to unload, bale them out and load again. About a hundred yards up the canal a sunken boat caught nearly all the tow lines, and a strong wind blowing across the canal added to our difficulties. The result of this was that we did not get fairly started till it was dark, about 6.30 p.m. We came across several

more sunken boats, but none so objectionable as the first, although in the dark without a moon, it was almost impossible to see what one was doing. Our rate of progress was very slow, for we did not reach Nefische till 10 p.m. We came to a halt on the near side of the railway bridge for the night, and after feeding and watering the horses, and getting some tea and biscuit, we lay down on our blankets, all very tired and glad to get a little rest. The pariah dogs, which are half wild, howled round us all night, and prevented our sleep from being as unbroken as we might have wished.

"Monday, Sept. 11th. Up at 4 a.m. We did not get properly started till 6.30 a.m. We were getting the rafts all right under the railway bridge, when one of the tarpaulin boats attached to the last raft sank, and it took an hour to drag it out of the water and make it right again. We had just got through the bridge, and were starting again when the same objectionable boat sank in the middle of the canal, and turned over. I had to drag both the boat and stores out, not wishing to block the way. This was eventually done, and leaving both boat and stores on the bank, we made a fresh start. We got on pretty well for some time, with only minor disasters, such as tow lines breaking, horses chafing and their saddles turning (we were using the lasso for towing). The rafts were so overloaded that the pontoons (Blanshard's infantry pontoons, obsolete since 1870, but supplied to us as there were none of the service pattern in store), were quite under water, and this made them most difficult to tow. After about two hours' march, another of these tarpaulin boats, filled with tents, collapsed and went to the bottom. Fortunately just at that moment a convoy of our pontoons towed by a steam launch, taking stores from the base to the front, passed us. They took our tents on for us, and hawling the sunken boat out of the way, left it on the bank as a memento of our misfortunes. At 12 o'clock we reached El Mafar, where we found Rochfort Boyd and the Field Park R.E., and the 87th Regt. We had dinner there, and got under weigh again at 4.30 p.m. Our first difficulty was to get through the dam, which was very shallow, except in the middle where it had been deepened, and was just wide enough to allow our rafts to get through. The difficulty was soon solved by getting two men to strip, and piloting the rafts through with their help. We had also some difficulty in getting through the dam at Mahuta, after which everything went on smoothly until 8 p.m., when we halted for the night about $2\frac{1}{2}$ miles from Mahsameh.

"Tuesday, Sept. 12th. On waking this morning at 4 a.m., I heard a great commotion, and as the noise was coming from where the horses were picketed I went to see what was the matter. At one end of the line my horses were picketed, and at the other were two big horses nearly seventeen hands high, who seemed always to have an exuberance of spirits. The trumpeter, on blowing reveillée, went too close to the big horses; they took fright and started off, pulling up the picket posts, which naturally do not hold well in this sand. A regular stampede followed right down the line, my two unfortunate horses being pulled off their

legs. The horses were soon stopped, but not till after some damage had been done. The drivers had been sleeping in front of their horses, and the charge passed over them, one man getting his arm broken and my bâtman having his collar bone broken. This was a bad beginning to the day's work, as we were so short of drivers. However, I bound up their injuries as far as was practicable, and sent them on to Kassassin."

The remainder of the transit to Kassassin was a repetition of the misfortunes of the preceding day.

"We paraded again at 11 p.m., but owing to the extreme darkness it was some time before we could get our things in order and start off. Our bridging equipment consisted of two 3-pontoon (service) rafts and eight 3-pontoon (Blanshard) rafts under Sandbach. All these had been made during the afternoon and were to be towed up. They were made above the lock, so we had only to hook in and start fair on our journey. The more mobile part of the bridge equipment was under me, and consisted of four pontoons and wagons complete, and one spare wagon with extra roadway and stores. With the exception of the spare wagon, which had only four horses, each subdivision was horsed with six horse teams. The reserve stores which consisted of spare pontoons and superstructure, under the charge of Artificer Serjt. Beach, followed in rear. We moved along up the canal for nearly a mile, halting opposite the camp of General Macpherson's Indian Brigade. Here we threw a bridge across for the 72nd, who came over to our side. The night was so dark that unless our men had been very practised pontoniers, making a bridge would have been a matter of serious difficulty. As it was, it took a considerable time and would hardly hold a candle to our peace practice on the Thames, which our men once bridged between Datchet and the Home Park in 22 minutes, when the Queen and Shah of Persia were looking on. We started again about 2.30 a.m., but could only get along very slowly, the ground being very rough, and intersected at places with the shelter trenches the Egyptians had thrown up in their attack on Kassassin Camp. It was impossible to see them in the dark, and the first notice we had of their proximity was generally one of the leading horses nearly coming on his nose. Fortunately they were neither very numerous nor very deep, but at night even the smallest obstacles assume gigantic proportions. We marched slowly and wearily along without a halt, passing the 17th Comp., R.E., who were sent up for the purpose of cutting the dam, and the Naval Brigade with their teams of blue jackets cheerily dragging their Gatlings through the deep sand, and the iron clad train some little way off on our right, the 72nd ahead of us, and the Indian Contingent on our left, on the south bank of the canal. The remainder of the troops, consisting of Willis's and Hamley's divisions, were from a mile to a mile and a half distant on our right. At 4.55 a.m. (by my watch, for the accuracy of which I will not vouch), just as the first streak of dawn was appearing in the east and making surrounding objects visible, the signal for the commencement of the battle was given by an artillery salute from the Egyptian lines, which appeared to be quickly

replied to by the field guns on our side. The artillery duel was not long in passing along the line, and soon we found them coming in our direction, but fortunately falling one or two hundred yards short. They were percussion shells which, landing on the soft sand, did not burst. As we got nearer some Shrapnel shell were fired (it is just possible that they may have been fired by our own guns, which I afterwards heard were shelling an outwork from the rear, and the shells coming over the top of the hill would come somewhere in our direction); some of them came rather unpleasantly close, one just whizzing over our heads and bursting among the camp followers of the Indian Brigade on the opposite bank of the canal. The artillery fire was very soon followed by a furious rattle of musketry, which seemed to last for about twenty minutes, and then suddenly all was quiet, except for an occasional stray rifle shot. The smoke and mist hung over the ground, so it was hardly possible to tell what was going on, but we kept advancing, as our orders were to follow close, when suddenly a high bank of earth rose up before us, and to my astonishment I discovered that we were at the foot of the enemy's intrenchments, and that all resistance was over, and the battle at an end. Although no one had any doubts as to the issue of the fight, we had anticipated a hard day's work, and were rather surprised as well as pleased at getting in so easily. Our men were in splendid spirits, and keen to have a few rounds at 'Arab Boy,' as the chief of the Egyptian army was called by them; and although the night march through the sand was somewhat trying after the hard day's work, there were no complaints or grumbling, and all were cheerful and anxious for the fray. For our part we got in without any fighting, and were only exposed to a very indifferent shell fire, which, had it been more accurate, might have done us some damage. On arriving at the intrenchment we could see the Arabs flying in every direction. Not knowing whether there might be any interior retrenchment we hastily made a very rough roadway by the aid of the dam, which here crossed the canal, and pushed on as fast as possible until we arrived at the lock, where we found the majority of the troops had already arrived. Here we unhooked and watered the horses."

The following account of the doings of the C or Telegraph Troop at the same battle is from the pen of Major Sir Arthur Mackworth:—

"On the 12th Sept. Lieut Anstruther and No. 3 Section joined me at Kassassin, and I received orders for the march on Tel-el-Kebir. We were to follow the left centre of the advance on the north side of the canal with a field cable; and the Indian mule telegraph train, which had been placed under my orders, was to do the same for Sir H. Macpherson's advance on the south side. Just before dusk a detachment of our men under Corp. Elsmore, R.E. was employed under the direction of the Brigade Major (Fraser, R.E.) to lay out a line of telegraph poles, which should give the direction for the advance of the Highland Brigade. This they did for a distance of over two miles in front of our outposts, and considering that they were on foot and liable at any

moment to be swooped down upon by the enemy's cavalry, it was a service of possible danger."

"At 7 p.m. on the 12th we commenced reeling out our line in a direction W. by N. from Kassassin, having connected it with the permanent line along the railway, so that messages could be transmitted back to Ismailia. We moved over the desert in single line at fullest interval, the cable wagon which was paying out being on the left of the line and the dismounted men, in two detachments, one on each flank of the line. Our steering was by the stars, and when we had got about a mile in front of our outposts, I thought it desirable to wait for the Infantry, who did not start till some time after us. Just at midnight Sir Garnet came up and sent a message through our line to Sir H. Macpherson. We then bivouacked till about 2 a.m., when we moved forward again, and just before daybreak, wishing to know our whereabouts, I sent a N.C. Officer to ascertain what the body of troops next on our right was. To my great satisfaction we found that it was the Head Quarter Staff, so that we had hit off our position to a T."

"I was then ordered to halt, and shortly afterwards the enemy opened fire, sending a shell or two unpleasantly near us. Sir Garnet ordered me to retire out of artillery fire, and presently the action became general. During the action one or two messages of a routine nature came for Sir Garnet from England, which I delivered to him personally, and was told to move forward about 1000 yards to where the Marine Artillery were halted and there await further orders. No further orders were received, however, until Major Maurice, R.A., came to tell me to come on with all speed to Tel-el-Kebir Railway Station, distant about three miles from the point where we were. I left the main body to follow at the ordinary pace, and told Lieut. Foster to bring on the cable wagon and a cart with reserve cable at a good round trot. We found it was hopeless to have a man toiling after the wagon through the sand overhauling the cable as it payed out, so I made him jump up on the wagon and let the cable take its chance. It broke several times, but we found it quicker work to stop and mend it than to regulate our pace by the man on foot, and the proof of our conclusion being the right one is, that we did the three miles in half an hour, which could not have been done otherwise."

"We bustled through the lines of Tel-el-Kebir, hardly stopping to look at the results of the action, and reached the railway station at 8 a.m. We established our field telegraph office in the saloon carriage which Arabi had travelled in the day before, and in making earth found immediately that we were through to Kassassin. We had ten miles of cable out, which means twelve drums, and consequently eleven joints in addition to the five or six joints due to the cable breaking in the last three miles, and I think it scores to the credit of the detachment who worked the cable that in spite of these numerous joints, and the hurry and excitement under which they were made (and some of them in darkness), every joint was so honestly finished off that there was no fault along the line from the time it was laid until it was taken up the same evening. As soon as we were ready Sir Garnet's Military Secretary

handed me messages for transmission to the Queen, the Secretary of State for War, and others announcing the victory. These were sent off at 8.30 a.m., and at 9.15 we received Her Majesty's reply. I believe this to have been the first occasion on which a British General has been able to telegraph the news of his victory from the actual field of battle, and I can only wish that the message had been sent back to where we were halted, instead of awaiting us at Tel-el-Kebir railway station, by which we should have gained quite an hour in time, as the General's message was dated at 7 a.m."

"We worked with the Theiber sounder and telephone, and from the time the line was opened until 6 p.m., when we shifted on to the permanent line which Lieut. Hippisley had in the meantime been repairing, I think the instrument had not a moment's rest. As soon as the permanent way was in working order, we began reeling up our ten miles of cable preparatory to any further move."

The after work of the Telegraph troop in Egypt and Bechuanaland having been performed subsequent to its amalgamation into the Telegraph Battalion, the description will be found in the next Chapter.

The following is a list of the officers who have commanded the Troops since their first formation to the present time:—

Captain Siborne, 1855, 1 Troop only.

Captain Duff, 1860, 1 Troop only.

Captain Duff, 1863, Train of 2 Troops and Depôt.

Lieutenant-Colonel Fitzroy Somerset, 1871, Train of 3 Troops and Depôt.

Lieutenant-Colonel Sir H. Elphinstone, K.C.B., V.C., 1873, Train of 3 Troops and Depot.

Lieutenant-Colonel Sir H. Elphinstone, K.C.B., V.C., 1877, Troops and Companies.

Colonel A. R. Lempriere, January 1st, 1882, Troops and Companies.

Lieutenant-Colonel H. H. Jones, December 1st, 1882, Troops and Companies.

Lieutenant-Colonel R. Athorpe, 1886, Troops and Companies.

The latest development of this branch of the Engineer service has been what it is proposed to term the Mounted Detachment. In the Egyptian war of 1885 an experiment was tried of adding to the Corps of Mounted Infantry a detachment of Mounted Engineers, who were intended to move with them and to supplement their action by providing a thoroughly mobile Engineer service. This body was taken from No. 11 Field Company, and consisted of 1 Officer (Lieutenant Sandbach) and 27 men. The Sappers carried with them a light assortment of tools and a proportion of gun-cotton, tube wells, and sand bags. They were mounted on Arab

horses. They reached Suakin on April 8th, 1885, and joined the head-quarters of the Mounted Infantry forming the third division of H Company, the other two divisions consisting of men of the Coldstream Guards.

The experience gained in this short campaign was valuable; the men shared in all the duties of the Mounted Infantry in addition to performing such other work as their special training enabled them to accomplish, viz., well-sinking, demolitions, &c. The troops being recalled in the middle of May, the Mounted Detachment was broken up and rejoined the 11th Company.

This experiment was considered so successful and so capable of further development that it has been decided to create a permanent Mounted Detachment as a nucleus of a larger force to be raised in time of war. It is intended that these men shall be mobile enough to move with Cavalry, and at the same time carry a sufficient supply of Engineer stores to enable them to perform any work that may be necessary. As at present approved, the Detachment is to consist of three sections including 4 officers and 100 mounted men, with 12 dismounted men, who are to ride on the carts which accompany the force. Each section is to have 1 Tyler's double cart, 2 forage carts, and 2 pack horses. Chests of artificers' tools, gun-cutton, sand bags, canvas hose, intrenching tools, and other necessary Engineer stores are conveyed on the carts and pack horses, and the whole is to move as rapidly as cavalry, and to be able always to keep up with them. In fact they will provide for the Engineers the same mobility that the Horse Artillery does for the sister service. Doubtless this is only the first instalment of a scheme capable of great enlargement. In future campaigns, works, both of construction and demolition, will be carried out with far more rapidity than has hitherto been possible.

CHAPTER III.

The Companies of the Royal Engineers.

Formation of Soldier Artificer Company at Gibraltar in 1772—Establishment of Military Artificers at Home in 1787—A Company sent to Flanders in 1793—Foreign Service Companies—Stations in 1800—Maltese Military Artificers—Creation of Sub-Lieutenants—Large Augmentation and Division into Battalions in 1811—Establishment of the Chatham School—Change of Title to Royal Sappers and Miners in 1813—Dress changed from Blue to Scarlet—Captain Rice Jones made Brigade-Major—Reduction of the Maltese Artificers—Extensive Reductions after the Peace—Establishment of Survey Companies in 1825—Large Augmentations for the Crimean War—Change of Title to Royal Engineers—Employment in the Indian and China Wars—Depôt Companies—Postal Telegraph Companies—Submarine Miners—Railway Companies—Field Companies—Present Classification—Sketch of Telegraphic Work—Railway Work—Militia and Volunteer Engineers—Indian Sappers and Miners—The Burma Corps—The Eastern Battalion—The Jamaica Company.

The origin of the Companies of Royal Engineers is to be traced to the Corps of Military Artificers, created at Gibraltar by Royal Warrant dated March 6th, 1772. Prior to that year the extensive works required to place the fortress in a due state of defence had been carried out, partly by artificers and labourers furnished from the regiments stationed in the garrison, and partly by civil workmen sent expressly from England or hired on the spot. These latter had usually proved very inefficient and difficult to deal with, being under no sort of discipline, whilst the supply of skilled soldiers was scanty, intermittent, generally not of good quality, and liable to much fluctuation owing to the frequent calls of ordinary garrison duty.

Under these circumstances Lieutenant-Colonel Green, the Commanding Engineer at the station, suggested to the Governor, General Eliott (who had himself been an Engineer Officer in his earlier days), that it would greatly facilitate the rapid execution of the works, if a corps were raised under military discipline, to furnish a constant and trustworthy supply of skilled labour, and at the same time secure a valuable addition to the military strength of the fortress in time of need. The Governor warmly supported the plan, and the scheme was submitted for the favourable consideration of the Secretary of State. The result was that

the Royal Warrant already alluded to was issued, authorizing the formation of a Company of Artificers, to consist of

1 Serjeant-Major,	with pay at . .	. .	3s. 0d. per diem.
3 Serjeants	„ . .	. .	1s. 6d. „
3 Corporals	„ . .	. .	1s. 2d. „
60 Privates	„ . .	. .	0s. 10d. „

(who were to be either stonecutters, masons, miners, lime-burners, carpenters, smiths, gardeners, or wheelers).

1 Drummer, with pay at . . . . 0s. 10d. per diem.

This body was to be commanded by officers of the Corps of Engineers, and was to receive the title of "The Soldier Artificers' Company."

The officers first attached to it, were—Lieutenant-Colonel William Green as Captain; Captain John Phipps, Captain-Lieutenant and Captain Theophilus Lefanu, and Lieutenant John Evelegh.

Within a year the Company was augmented to the extent of 2 Non-commissioned Officers and 23 Privates, making a total of all ranks of 93, and this number was still further increased in 1776 to 116.

The first military service of the new Corps was at the celebrated siege of Gibraltar, already described in this work. It will, therefore, be unnecessary to enter here into any further details on the subject. During this siege, as has been shown, the Military Artificers did their duty well, and so far established their reputation that in 1786 they were raised to a total of 275 Non-commissioned Officers and Privates, and divided into two Companies; the Commanding Engineer, now Sir William Green, Bart., retaining the supreme control, and the two next senior officers of Engineers becoming the Captains.

The credit of having first suggested the advisability of establishing a similar corps in England, belongs unquestionably to Lieutenant-Colonel Hugh Debbieg, of the Engineers. He, as far back as 1779, had written to Lord Amherst in the following terms:—

"I must take the liberty of mentioning how very advantageous to the service it would be if a corps of artificers was to be selected from the army. . . . The great attention of the ancients to this particular was wonderful, and the highest point of perfection in the Roman legion was, that when it made detachments, though ever so small, they carried with them a just proportion of the component parts of its excellent system—artificers of all denominations. Modern armies differ from those of the ancients scarcely in nothing but the arms they use, in all other points we cannot imitate them too exactly. . . . It is a most essential part of the soldier's duty, I allow, to be as expert as

possible at covering themselves with earth works, but then there is also a necessity for a band of leading men capable of instructing others, and of conducting works with more regularity than has been usually done where I have yet been on service, as also with greater dispatch."

Debbieg, of course, received the usual application of cold water on his proposal. Lord Amherst's reply ran thus:—

"Your idea about forming a corps of artificers from the army is a very good one as far as that such a corps would be very desirable, but at a time when it is a material of consideration to increase the army by every possible means, the forming such a corps cannot be thought of. In the case of any service happening in this country, the general business of the pioneers must be done by the able-bodied men amongst the peasants of the country."

In 1786, however, when the Duke of Richmond, then Master-General of the Ordnance, was hard pushed to obtain funds for carrying out his scheme for the fortification of Portsmouth and Plymouth dockyards, he proposed to Mr. Pitt to create a Corps of military artificers on the lines of the one already existing at Gibraltar, by means of which, he asserted, considerable economy might be effected in executing the works. His proposal was accepted, and on October 10th, 1787, a Warrant was issued for the purpose. At first no Parliamentary sanction seems to have been sought for the creation of the Corps, but when it was included in the Mutiny Act of the following year, the new scheme met with violent opposition in both Houses. The following summary of the debate in the House of Commons is taken from Dodsley's "Annual Register":—

"On the 12th of March, the report of the Committee on the Mutiny Bill was brought up, and on reading the clause for incorporating in the army the newly raised corps of military artificers, the same was strongly objected to as a dangerous innovation, and as militating against the most favoured principles of the constitution. The same system, it was said, might next be extended to shipwrights and so on, to every description of persons in the service of the executive government, and therefore, the House was called upon to repel so alarming an innovation *in limine*. In defence of the measure it was urged that it would be attended with an annual saving of £2,000 upon an expenditure of £22,000, and that it was necessary to extend the military law to the corps in question, as the only means of keeping them together, and preventing their desertion of the public service in time of war. This disposition to adopt a new principle of expediency and economy upon a subject which went to the diminution of the liberties of the subject, instead of the old principle of actual necessity, was severely reprobated. Several country gentlemen declared that if the House should agree to put six hundred Englishmen under martial law, merely for the paltry consideration of saving £2,000 per annum, they would betray their constituents, and would be devoid of those feelings for the constitution which ought to make their distinguishing character. It was denied that any necessity for so extraordinary a surrender

of the liberties of a part of the community was made out, it having never been asserted nor being indeed true in fact that there was any difficulty in procuring artificers for the Ordnance service in time of war. The sense of the House being taken on the clause, there appeared ayes, 114; noes, 67."

The matter was debated with equal severity in the House of Lords, but eventually the clause was carried in that Chamber without a division.

The Warrant created a force of six companies of one hundred men each, to be officered from the Corps of Royal Engineers.

The constitution of each Company was fixed as follows :—

1 Serjeant-Major,	with pay of	2s. 3d.	per diem.
3 Serjeants	,,	1s. 9d.	,,
4 Corporals	,,	1s. 7d.	,,
12 Carpenters	,,	9d.	,,
10 Masons			
10 Bricklayers			
5 Smiths			
5 Wheelers			
4 Sawyers			
8 Miners			
2 Painters			
2 Coopers			
2 Collar Makers			
30 Labourers	,,	6d.	,,
2 Drummers	,,	9d.	,,

Working pay was also to be given, not exceeding 9d. per diem, for the days actually employed on the works.

The Companies were not transferable, but were to be localized one each at Woolwich, Chatham, Portsmouth, Gosport, Plymouth, and the Channel Islands. The following officers, being the Commanding Royal Engineers at those stations, became the first Captains of the Companies :—

Colonel Robert Morse, Woolwich.
Colonel William Spry, Chatham.
Colonel John Phipps, Portsmouth.
Lieutenant-Colonel James Moncrief, Gosport.
Lieutenant-Colonel Frederick George Mulcaster, Plymouth.
Lieutenant-Colonel Alexander Mercer, Channel Islands.

These officers received each a contingent payment of £56 per annum. There was also an allowance of 2s. per diem for a subaltern of Royal Engineers to perform the duties of Acting-Adjutant to each Company.

The Companies received the arms common to the period, the Serjeants carrying pikes and swords, the Serjeant-Major having

sword only, without pike. The labourers were distinguished from the artificers by the comparative coarseness of their clothing, and the absence of gold lace, which the latter wore on their hats.

"It may not be amiss to notice, in connection with the dress of the Corps, an interesting offer that was made to the Companies at Gibraltar on the change of their uniform from red and yellow to blue and black. At the fortress the companies were much esteemed for their good conduct and civility, and the best understanding existed between them and the inhabitants. This feeling of respect was particularly shared by the Jews, who desired to express it in a manner that would be more convincing than a mere verbal assurance. On the new clothing arriving at the Rock, the Jews regarding the alteration with satisfaction, agreed among themselves to provide for the Companies, as a mark of their esteem, whatever gold lace might be required for the clothing free of cost, to be worn in the place of the yellow tape, but it need hardly be mentioned that the desired deviations of this kind people from the established pattern of the Corps could not be permitted." *

The recruiting for the new Corps went on briskly. Conolly says on this point :—

"There was no standard as to height fixed, but labourers were not enlisted over twenty-five years of age, nor any artificer over thirty, unless he had been employed as a mechanic in the Ordnance Department and known to be an expert workman of good character. All recruits, however, whether previously under the Ordnance or not, were to be 'strong able-bodied men, free from all infirmity, and duly qualified for their several trades and occupations.' The miners were all got from Cornwall. The bounty given at first was five guineas to each attested recruit, which, on the 21st November, 1787, was reduced to the usual peace allowance of three guineas. These general instructions for recruiting were soon afterwards much altered by the Duke of Richmond, who was anxious to make the Corps as perfect as possible with regard to tradesmen. On the decision of his Grace all the men were afterwards enlisted as labourers at 6d. per day. The bounty was continued at three guineas. Growing lads from sixteen to eighteen years of age not under five feet four inches high were preferred before all others, and were instructed in the trades most required by the Corps. Over eighteen years of age none were taken less than five feet six inches. This was a measure of great precaution, as several men had already enlisted as artificers, who, upon a fair trial, were found to know but little of their craft. The Duke now thought to ensure his object by enlisting every man as a labourer, and after a few months' experience of his abilities, promoting him to be an artificer or retaining him as a labourer until recommended for preferment. On promotion to artificers each man received a bonus or reward of two guineas, an additional 3d. a day pay, and was distinguished from a labourer by being allowed finer clothing and a gold-laced hat."

* Conolly, vol. i. p. 67.

Until the year 1789 the Captains of the different Companies communicated with the Board of Ordnance direct and without any common channel. This was found very objectionable, as it tended to destroy all cohesion in the Corps. It was therefore decided early in this year to appoint a Colonel Commandant, and Sir William Green was selected for the post. At the same time Lieutenant William George Phipps, R.E., was made Quartermaster.

The first occasion on which the new Corps did duty in a military capacity in combination with other troops was at a camp of exercise formed on Bagshot Heath in 1792. A Company of Artificers had been made up by detachments drafted from the various stations, and was placed under the command of Lieutenant-Colonel Moncrief, R.E. Whilst encamped the men were employed in bridging, throwing up earthworks, and mining. In the latter duty they made a brilliant display, running a gallery under a wooden blockhouse constructed for the purpose, and blowing it up, to the intense admiration of a vast crowd of spectators. For this display they received the warm commendation of the Duke of Richmond.

In 1793 they were again employed in a similar manner at Brighton. Whilst in the act of throwing a bridge across a stream Mrs. Fitzherbert, the wife of the Prince of Wales, chanced to pass by. She watched the proceedings with much interest, and on the conclusion of the work she left a sum of money sufficient to provide a day's pay for each man engaged. She also took note of the name of the Serjeant in charge of the party. Shortly afterwards this Non-commissioned Officer, whose name was John Johnston, received a commission in the 29th Foot, and it was always considered that his promotion was a consequence of Mrs. Fitzherbert's interest in his bridging operations.

In March, 1793, a Company of Military Artificers was formed of detachments drawn from the various stations, and placed under the command of Captain Gother Mann, R.E. This Company embarked on the 16th of the month to join the army in Flanders, where it did good service. A detachment was also provided for duty in the West Indies. Some discontent was created in the force by these demands on them, for although it had been carefully impressed on each recruit, when enlisted, that he was liable to be called on for general service, the men had never seriously contemplated the enforcement of this condition.

To meet the difficulty a Warrant was issued on September 11th, 1793, directing the addition of four Companies for special service abroad. Two were intended for Flanders, one for the West Indies, and one for Canada. The Corps was, by this Warrant, established at a strength of 1,000 men, exclusive of the Gibraltar Companies.

This Warrant seems never to have been thoroughly carried into

effect, only one Company being allotted to Flanders and that for Canada not having been formed. The total number, after these additions had been made, amounted to eight, at which figure they remained until June, 1797, when the two Gibraltar Companies were incorporated with the remainder, bringing up the number to ten. Even after that addition the nominal establishment of 1,000 men was not reached, owing to the drain caused by the unceasing severe losses from war and sickness in the West Indies. In the eight years from 1793 to 1800 inclusive, the deaths in this Company amounted to no less than 239. As during that period only about 350 men had joined, it seems that two-thirds of the entire number must have fallen victims either to wounds or disease. At the close of 1800 its strength did not exceed seventy-eight men of all ranks.

At the commencement of the present century the following stations were occupied, viz.:—Woolwich, Chatham, Portsmouth, Gosport, Plymouth, Jersey and Guernsey, Gibraltar, Minorca, Nova Scotia, and West Indies, whilst detachments were serving with the army in Egypt under Sir R. Abercrombie, and at Jaffa under Major Holloway with the Ottoman army.

In 1806 three Companies of Maltese Artificers were raised, two of which were to be stationed in Malta and Gozo, the third being for general service throughout the Mediterranean; all were officered from the Corps of Royal Engineers. They received the title of Maltese Military Artificers, and remained, throughout their existence, a distinct body of men. Their total number amounted to 276, including staff. In the same year two additional Companies of Military Artificers were raised at home for general service, thus augmenting the number to twelve. By this Warrant, which was dated September 5th, 1806, a reorganization of the Corps took place, and for the first time the Companies were distinguished by numbers. They were stationed as under:—

1st Company at Woolwich.
2nd ,, ,, Chatham.
3rd ,, ,, Dover.
4th ,, ,, Portsmouth.
5th ,, ,, Gosport.
6th ,, ,, Plymouth.
7th ,, ,, Spike Island.
8th ,, ,, Channel Islands.
9th & 10th Companies at Gibraltar.
11th Company at West Indies.
12th ,, ,, Nova Scotia.

The strength per Company was raised from 100 to 126, thus making the establishment 1,514, including staff. Two new

ranks were created, one that of a commissioned officer called Sub-Lieutenant and the other that of Second Corporal. The Sub-Lieutenant was to be junior to Second Lieutenants of the Royal Engineers or Ensigns of the line.

Under this scale the ranks and pay were as follows in each Company:—

1 Sub-Lieutenant with pay of 5s. 0d. per diem.
1 Serjeant-Major „ 3s. 11½d. „
5 Serjeants „ 2s. 6½d. „
5 Corporals with pay of 2s. 2½d. to 2s. 4½d per diem by length of service.
10 Second Corporals with pay of 1s. 9d. per diem.

30 Carpenters
20 Masons
18 Bricklayers
10 Smiths
10 Miners
4 Wheelers
4 Collar Makers
2 Coopers
2 Painters
4 Drummers

with pay of 1s. 2½d. to 1s. 4½d. per diem by length of service.

At the same time working pay was increased to 1s. per diem.

The new rank of Sub-Lieutenant was expected to become a great boon to the Companies, as it would naturally be an object of ambition to the Sergeant-Majors and enhance the status of the Corps.* The existing Serjeant-majors of the respective Companies, who had all been selected from the Artillery, were the first on whom the new rank was conferred. On the establishment of this grade the adjutancies were abolished. All the duties of drill and discipline, and the regulation of the interior economy, fell naturally to the Sub-Lieutenant, under the supreme control of the Captain.

In the year 1807 the appointments of Adjutant and Quarter-master, which up to that time had been held by separate officers of Engineers, were consolidated, and Captain John Thomas Jones, R.E. (afterwards Sir John T. Jones of Peninsular fame), became the first holder of the double office. From this time the head-quarters of the Corps were established at Woolwich.

The outbreak of the Peninsular War led to severe calls upon the Corps of Military Artificers. These were, as far as practicable, answered from time to time by drafts on the various Companies.

* In practice, however, it did not prove very satisfactory, and, as will be seen hereafter, had eventually to be abolished.

Eventually, however, it became apparent that if the army were not to be starved in its Engineer arm, the importance of which was daily becoming more and more apparent, a large augmentation of the force would be inevitable. At length, on May 28th, 1811, a new Warrant was issued, which at one stroke nearly doubled the Corps. Under this arrangement it was divided into four 8-Company Battalions, each consisting of 1 Sub-Lieutenant and 88 Non-commissioned Officers and Privates, the total of all ranks being 2,861. At the same time it was ordered that the Companies should no longer be localized, but be removed by rotation from station to station as required. That this change had become absolutely necessary, is shown by Sir Charles Pasley in his work on "Elementary Fortification:" *—

"From the close of the American War till the year 1811 all the Companies of Royal Military Artificers were kept permanently fixed at their respective stations both at home and abroad, where they remained for life, in what may for Military men be styled a state of vegetation, so that there were at that period a vast number of men who had actually grown grey in the corps who had never entered a transport nor made a single day's march from the head-quarters of their Company. To the men at Gibraltar and other foreign stations the service of the corps was thus rendered almost equivalent to transportation for life. Everywhere they intermixed with civilians, they married in a proportion unknown in any other corps, so much so that the number of women and children belonging to one Company was often equal to that of a battalion of the line."

The newly organized Companies were distributed as under:—

Woolwich	6
Chatham	2
Portsmouth and Gosport	3
Plymouth	2
Dover	2
Guernsey and Jersey	2
Cork	2
Gibraltar	3
Newfoundland	1
Halifax	1
West Indies	2
Cadiz	2
Portugal	4

The constitution of each Company was as follows:—

1 Sub-Lieutenant.
5 Serjeants.
5 Corporals.

* Page 4, vol. i.

5 Second Corporals.
3 Drummers.
15 Carpenters.
10 Masons.
6 Bricklayers.
4 Smiths.
2 Wheelers.
2 Collarmakers.
1 Cooper.
30 Miners.

The Companies at Cadiz were the 6th and 7th of the 1st Battalion, and those in Portugal, the 5th, 6th, 7th, and 8th of the 2nd Battalion.

By the end of the year the reconstruction was completed, and the force so far increased as to be in a condition to supply most of the demands made on it.

The year 1812 witnessed the first establishment of a school for military field-work instruction at Chatham, since developed into the present School of Military Engineering. Major C. W. Pasley, R.E., who, whilst at Plymouth, had taken much pains in the instruction of the Companies stationed there, in the arts of sapping and mining, was the officer selected to create and conduct this novel establishment. The failure of the sieges of Badajoz in the previous year had shown the evils which arose from the want of a special field-work training as distinguished from that of an ordinary artificer. Lieutenant-Colonel Fletcher had strongly urged the creation of a corps of Sappers and Miners, to be selected from amongst the existing Military Artificers.

The School having been established under the able guidance of its Director, Major Pasley, soon showed by its results the wisdom of the step, and the first drafts despatched to the Peninsula of men who had received at Chatham their preliminary training, became a valuable addition to the scientific branch of the army. True, they were at first greeted with the sarcastic title of Pasley's Cadets by their less instructed comrades, but in a very short time all ridicule or objection was silenced, and as fresh men were gradually added to the fighting force from the School, its advantages became more and more apparent.

On August 4th, 1812, an order was issued by the Master-General of the Ordnance, directing "that the Royal Military Artificers should be hereafter styled the Royal Military Artificers or Sappers and Miners." On March 6th, 1813, this complex title was again changed to the simpler one of "Royal Sappers and Miners," the term Military Artificer being altogether dropped. At the same time the colour of the dress was changed

from blue to scarlet, to render the wearers less conspicuous to the enemy when acting with working parties of the line.

Hitherto there had been a great want of uniformity in the arms and accoutrements of the corps, and many irregularities had from time to time crept in.

"At Newfoundland the detachment was armed with swords, cutlasses, and accoutrements of every shape saved from the American war. In the West Indies the Companies used the shattered remains of old armouries, and black accoutrements of various patterns. In Sicily the Military Artificers could only muster a few foreign cumbersome firelocks, whilst the Maltese Artificers were unable to appear with a weapon of any kind. For a number of years the Gibraltar Companies wore the obsolete accoutrements and cartouche boxes of a disbanded Newfoundland regiment, and a party of the Corps, on its way to the Peninsula, did duty with pikes and blunderbusses. Among the serjeants the swords and belts were very dissimilar. Permitted to purchase their own arms, more attention was paid to fancy and ability of payment than uniformity. These and other anomalies were progressively removed from the Corps, in consequence of the improved method of officering the Companies." *

The rank of Colour-Serjeant was introduced in July, 1813, one being appointed to each Company, with the pay of 2s. 9½d., that of the Serjeant-Majors being at the same time raised to 4s. 1¼d.

Early in 1814 the appointments of Adjutant and Quartermaster, which, since 1807 had been held by the same officer, were divided, James Galloway being commissioned from the ranks to the post of Quartermaster, with pay at the rate of 8s. per diem, and a servant's allowance of 1s. At the end of the year the appointment of Adjutant was raised to that of Brigade-Major, Captain Rice Jones, the Adjutant at the time, being the first to receive the new rank.

The Peninsular war, having ended whilst the army was still before Bayonne, the five companies of Royal Sappers and Miners, which were divided between that place and Toulouse, were marched to Blanquefort and Bordeaux, there to await embarkation. One, the 2nd/4th, was sent to North America, and the other four returned to England. Meanwhile, the 4th/2nd had joined the expedition to Holland, under Sir T. Graham, at the end of 1813, and to this was added the 4th/3rd in July, 1814, and the 5th/2nd in January, 1815.

In Canada, there were at this time three Companies, the 3rd/3rd, the 4th/4th, and the 2nd/4th, which, as has already been stated,

* Conolly, vol. i. p. 191.

went thither direct from France. Later on this Company was attached to the American expedition, under Sir George Prevost, and was joined by the 7th/1st, and 8th/2nd Companies. At the close of the American war these last three were recalled to England.

The return of Napoleon from Elba was followed by the despatch of an army to Belgium. The three Companies of Sappers at the time in that country, were now joined by seven others, viz., the 3rd and 6th 1st, the 2nd and 8th/2nd, the 1st and 7th/3rd, and the 1st 4th, and were distributed throughout the various fortresses in the Netherlands. After Waterloo, the 2nd/4th Company, which had arrived in England on the close of the American expedition, was also added, and with the others marched with the force to Paris.

When the army in France was reduced, six of the Sapper companies, viz., the 3rd and 6th/1st, the 2nd/2nd, the 4th and 7th 3rd, and the 1st/4th returned to England, leaving with the army of occupation only the 4th, 5th, and 8th/2nd, the 1st/3rd, and the 2nd/4th.

By Royal Warrant, dated October 5th, 1815, the two Maltese Companies, which had been raised in 1806 for Malta and Gozo, were disbanded, the third or general service Company was absorbed into the general establishment of the Corps, but retained the title of "Maltese Sappers and Miners."

In the month of January, 1816, the 7th/4th Company was despatched to St. Helena, where it remained until the death of Napoleon. It was commanded at the time by Major Emmett, R.E. Whilst at the station the Company was employed, partly in strengthening the sea defences of the island, and partly in erecting a house for the residence of the ex-Emperor, at Longwood, which, however, he never occupied, as he died before it was finished.

The question of a due armament of the Corps had been for some years a matter of discussion. The principle had been hitherto acted on that a working corps did not require firearms, and the force of Sappers in the Peninsula and in the Netherlands was armed with swords only. It was not till the close of the war that orders were given to supply firearms to the different Companies.

The return of peace led naturally to extensive reductions in the army, from which the Corps of Sappers was by no means exempted. In the month of August, 1816, a reduction of twenty-five men per Company was ordered, thus decreasing the total strength by 800 men. At the same time the rank of Sub-Lieutenant was abolished. As these officers had usually

been selected either from the Royal Artillery or other branches of the service, their position had gradually become a very unpopular one, nor had they proved of advantage to the Companies over which they were placed. In February, 1817, a Royal Warrant was issued, disbanding one of the four battalions and reducing each of the remaining twenty-four companies by ten men. In 1819 a still further reduction was made, and the peace establishment was fixed at twelve companies of sixty-two men each. The stations of these companies were—Woolwich, Chatham, Portsmouth, Plymouth, Gibraltar, Corfu, Bermuda, Barbados, St. Helena, Canada, and the Cape of Good Hope.

It may here be recorded that in the Company stationed at Corfu, there was a private named James Gordon, who having met with an accident whilst on the works in the island, was sent home and discharged with a pension of 9d. per diem, in the year 1820. In the year 1848, this ex-private of Sappers became, by inheritance, Viscount Kenmure and Lord Lochinvar.*

In the year 1824 a Committee of the House of Commons recommended the immediate extension of Survey operations to Ireland, in order to obtain an accurate valuation of that country. Colonel Colby, R.E., at that time the officer in supreme direction of the Survey department, applied to the Duke of Wellington, the Master-General of the Ordnance, for the creation of a Company of Sappers and Miners, to be raised specially for survey duties, and to be employed on the new work. This proposal was sanctioned, and on December 1st, 1824, a Royal Warrant was issued for the formation of a Survey Company of sixty-two men. This was speedily accomplished, and the Company, which was selected from amongst the most intelligent men of the Corps, was specially trained for its new duties under Lieutenant-Colonel Pasley, at the Chatham School. Major Reid, R.E., was appointed to the command of this, the first Survey Company, which received the number 13.

This step was speedily followed by the addition of a second Survey Company, created by Royal Warrant of April 4th, 1825, and numbered 14, which, as soon as it was organized and trained, was also sent to Ireland. At the same time another general service Company (the 15th) was raised to be stationed at Corfu, for the purpose of carrying out extensive works of fortification at the citadel there and at Vido. Later on in the year a third Survey Company (the 16th) was formed. With these augmentations the establishment of the Corps was brought up to 1,000 men. The calls for Sappers for foreign service having

* Conolly, vol. i. p. 236.

much increased, three additional general service Companies were raised by Royal Warrant of March 27th, 1827, one for service at Bermuda and two for Canada, where heavy works were being carried on in the construction of the Rideau Canal. The establishment now reached nineteen, with a strength in all ranks of 1,262.

"The fifth Company at Quebec on the 15th Nov., 1827, was present at the laying of the foundation stone of the monument erected to the memory of General Wolfe. All the masonic tools required for the ceremony were made by men of the Company, and the stone was lowered into its bed by some selected masons with Colour-Serjeant Dunnett. The formal laying of the stone was accomplished by the Earl of Dalhousie and Mr. James Thompson, a venerable man in the 95th year of his age, the only survivor in Canada of the memorable battle of Quebec, in which Wolfe fell. A few days afterwards the silver trowel used on the occasion was generously presented by his Lordship to Serjt. Dunnett."*

On the completion of the Rideau Canal the two Companies which had been raised to aid in its construction were reduced, thus bringing the total number back to seventeen.

A more serious reduction was, however, at this time pending. Economy was more than ever the strict order of the day, and Major-General Pilkington, the Inspector-General of Fortifications, in order to enforce it laid down the principle that 100 Sappers was a sufficient number to be attached to a unit of 4,000 infantry. Working on these lines, the Master-General of the Ordnance, Sir James Kempt, directed on August 30th, 1833, that the seventeen Companies should be compressed into twelve, of which nine were to be general service (including one stationed at Corfu and paid for by the Ionian Islands Government) and the other three Survey. Their strength was fixed at—

1	Colour-Serjeant,
2	Serjeants,
3	Corporals,
3	Second Corporals,
80	Privates, and
2	Buglers.
Total 91	

They were to be stationed as under:—

Woolwich	3
Chatham	1
Gibraltar	1
Carried forward . .	5

* Conolly, vol. i. p. 252.

Brought forward ..	5
Corfu	1
Bermuda	1
Halifax	1
Cape of Good Hope and Mauritius	1
Survey	3
Total	12

When this reduction had been completely carried into effect, which was not till the end of 1834, the total number stood at 1,070 of all ranks, the Corfu Company being on a smaller scale than the other eleven.

In July, 1832, the King directed that the Corps should bear the motto "Ubique quo fas et gloria ducunt" on their appointments, and this has ever since been its badge.

By Warrant of July 3rd, 1838, a Company was added, and on June 21st, 1841, a new Warrant gave a second, so that the total number was now raised to fourteen, and the establishment to 1,298 of all ranks.

In 1843, the old flint-lock musket with bayonet, which had been the weapon of the corps from the time when they had first been supplied with fire-arms, was changed into a percussion carbine and sword-bayonet. The latter was adopted to make up for the difference in length between the old musket and the new carbine.

In the year 1846 the wave of economy had receded, and augmentations throughout the army began to be carried out. Amongst other measures of this nature, it was decided gradually to increase the Corps of Royal Sappers and Miners by no less than eight new Companies. These additions were carried into effect in the course of the next four years on the following dates:—

1	Company was added on ..	..	April 1st, 1846.
1	,, ,,	..	Sept. 1st, 1846.
1	,, ,,	..	April 1st, 1847.
1	,, ,,	..	Decr. 1st, 1847.
1	,, ,,	(for survey duties)	April 1st, 1848.
1	,, ,,	..	Sept. 1st, 1848.
1	,, ,,	..	Feb. 1st, 1849.
1	,, ,,	..	March 1st, 1849.

The Royal Warrant sanctioning these additions was only issued on August 22nd, 1849, after they had been carried into effect.

There were now eighteen service Companies, including the one at Corfu, and four for the Survey. Seventeen of the service and one of the survey Companies had a strength of 100 Non-commissioned Officers and men each, and the other three survey

Companies, 105. The Corfu Company remained at a strength of 62 men. The total establishment, including staff, being 2,185.

Matters remained on this footing until the Russian War of 1854-5. At the first threatening of that tempest an addition of 20 men was made to each Company, raising the establishment to 2,658.

Before the war actually broke out four Companies were despatched to Constantinople, viz., the 11th under Captain Hassard, the 7th under Captain Gibb, the 8th under Captain Bourchier, and the 10th under Captain Bent. These four all embarked between February and April, and on the formation of the army into Divisions were attached as under, viz. :—

The 11th Company to the First Division.
„ 8th Company to the Second Division.
„ 7th Company to the Third Division.
„ 10th Company to the Fourth Division.

In July the 4th Company, under Captain Craigie, then stationed in Malta, was ordered to join the army, and in the same month the 2nd, under Captain King, was sent to the Baltic, where it was attached to the French force engaged in the descent on the Aland Islands. When the operations in the Baltic had been brought to a conclusion, it proceeded to the Crimea, where it landed in November. Meanwhile, the 3rd Company, under Captain Inglis, had joined the army in August, so that at the close of the year there were seven in the Crimea, all engaged at the siege of Sebastopol. In January, 1855, the 1st Company, under Captain Browne, and in May the 9th, under Captain Dawson, also landed at Balaklava, thus raising the numbers to nine.

In the month of April, 1855, the 23rd Company was added to the Corps, and in the following month the 24th, whilst in October two more, viz., the 25th and 26th, were raised. The 23rd was composed of mounted men, and placed under the command of Captain Siborne, to form the nucleus of an Engineer Train, as will be found recorded in Chapter II. of this Part. It embarked for Constantinople in August, but did not proceed farther. In March, 1856, the 24th Company, under Captain Pelly, and the 17th under Captain Lochner, were also sent to the East, but arrived too late to take any part in the war.

The enormous drain upon the resources of the Corps caused by these successive additions to the Engineer branch of the Expeditionary force, proved the urgent necessity which existed for further augmentations, no less than twelve out of a total number of twenty-two service Companies being thus engaged, leaving only ten to carry on the duties of all the other home and foreign stations. To

obviate this evil in the future a strong effort was made, and during the years 1856-7 the expansion was almost continuous.

In April the 23rd or Driver Company was converted into the A Troop, and a new 23rd Company formed. It was at this date that the first establishment of a regular band under Mr. Collins took place, the Corps up to this time having only had bugles.

The gallant services of the Corps of Royal Sappers and Miners were rewarded at the close of the war by the grant of the title of Royal Engineers. In the "London Gazette" of October 17th, 1856, the change was thus announced:—"The Queen has been graciously pleased to direct that the Corps of Royal Sappers and Miners shall henceforward be denominated the Corps of Royal Engineers." The separation of the officers and men into two distinct corps under separate titles had long been felt to be an anomaly, and one that worked prejudicially to the discipline and harmony of the service. The men were officered by the Royal Engineers, but they themselves were not known as such. It speaks wonders for the good sense and fidelity of the Sappers and Miners that they were under such circumstances so invariably loyal to their officers. This difficulty was now at an end. Officers and men, who had long practically considered themselves one Corps were for the future officially recognized as such. The gallant deeds of the Non-commissioned Officers and Sappers are as much a part of the glorious heritage of the Corps as are those of the officers, and there is no branch of the service where the true feeling of military brotherhood runs through all ranks more strongly than it does in the Royal Engineers as now constituted.

As a consequence of this change the rank and file were no longer termed Privates but Sappers. In the old *régime* they had been called Privates of the Royal Sappers and Miners, now they were to be Sappers of the Royal Engineers.

In November, 1856, the 27th Company was established.
„ December, 1856, the 28th „ „
„ February, 1857, the 29th „ „
„ March, 1857, the 30th „ „
and in April, 1857, the 31st and 32nd Companies were established.

In April, 1857, the newly formed 23rd Company was sent to China, but on reaching Singapore orders were found awaiting its arrival changing its destination to India, where its services were urgently required on account of the mutiny which had broken out in the Sepoy army, and which was threatening the loss of our Indian Empire. The Company landed at Calcutta in September, and served throughout the war until peace was restored. In

December, 1859, it proceeded to China to join the army then about to carry on the war in that country, which had been suspended during the crisis of the Indian Mutiny.

Meanwhile the 4th Company under Major Nicholson, the 11th under Captain Cumberland, and the 21st under Captain Neville, had embarked for Indian service and landed, the two former at Calcutta and the latter at Bombay in the month of November, 1857. These were the first Royal Sappers and Miners who ever served in India. During their stay in the country they were taken on the Indian Establishment, and ceased to figure on the home returns, which, in consequence, showed a perceptible decline in numbers. The 10th Company had embarked at the same time as the three last mentioned with the object of serving in India, but on touching at Ceylon they found their destination changed to China, to take the place of the 23rd diverted from China to India. This Company was followed almost immediately after by the 8th under Captain Lambert, and the two landed almost simultaneously in Hong-Kong in detachments, spreading over the months of February and March, 1858. There were at this time four Companies serving in the Indian Mutiny, viz., the 4th, 11th, 21st, and 23rd, and two in China, the 8th and 10th, afterwards joined by the 23rd from India. The other three Indian Companies at the close of the war were thus disposed of:—The 4th returned to England, and the 11th and 21st were sent to the Mauritius.

These four having been removed from the Indian establishment, brought up the home numbers to 3,967.

For some years past a number of men had been stationed at Chatham, undergoing instruction, but not attached to any of the thirty-two Companies. This detachment had gradually increased in strength until, by the middle of 1858, it had reached the number of 548. In July of this year it was broken up into four new Companies, the 33rd, 34th, 35th, and 36th, the detachment as such disappearing from the returns.

The formation of Depôt Companies dates from April 1st, 1861. On that day the 35th and 36th were converted from Service into Depôt Companies, and two additional Depôt Companies, the 37th and 38th, were formed, the latter absorbing the permanent Staff, supernumerary Serjeants, Band and boys. Two additional Depôt Companies, the 39th and 40th, were formed in August, 1862, to supply men for duty in India as Non-commissioned Officers of the Companies of Native Sappers and Miners. In April, 1868, the 41st Company for Bengal, the 42nd for Madras, and the 43rd for Bombay, were formed, to be paid on the Indian Establishment.

BATTERSEA

In May, 1870, the first detachment of Royal Engineers was sent to the Post Office to aid in carrying on the Telegraph duties of that Department. Their services were found so valuable that in the following month the 22nd Company, under Major Webber, was permanently attached to the Post Office, and became a Telegraph Company. In September, 1871, the 34th was also converted into a Telegraph Company, and attached to the Post Office. They remained in that position until March, 1884, when they were amalgamated with the C or Telegraph troop. The General Order carrying out this fusion, to date from April 1st, 1884, is thus worded:—

"The C Troop and the 22nd and 34th Companies R. Engineers will be formed into one body, under the name 'Royal Engineer Telegraph Corps.'

"The Royal Engineer Telegraph Corps will be comprised of two divisions as follows:—

"1st Division.—The officers, men, horses, and equipment hitherto forming the C Troop.

"2nd Division.—The officers, men, and equipment hitherto forming the 22nd and 34th Companies."

By another General Order, dated two months later, this title was changed into that of the "Telegraph Battalion Royal Engineers."

The first Submarine Mining Company was established in April, 1871, and the 4th Company was selected for the conversion. This was followed by the 33rd, in April, 1873; the 28th, in September, 1874; and the 27th, in April, 1882.

In April, 1877, the 23rd Company was formed into a Depôt for the Submarine Miners.

By General Order 100, of July, 1884, these four were broken up into six, to be named the 4th, 22nd, 27th, 28th, 33rd, and 34th Submarine Mining Companies—the old 22nd and 34th Companies having surrendered their numbers on being formed into the Telegraph Battalion—and to these have been since added the 21st, 30th, and 35th.

The 8th Company, under Captain S. Smith, was converted into a Railway Company in the summer of 1882, and having undergone a course of training in Railway duties, was despatched to Egypt as part of the expeditionary force under Sir G. Wolseley, where they performed excellent work. The 10th was also converted into a Railway Company, in January, 1885, prior to embarkation for Egypt, to construct the then contemplated Suakin Berber line.

When the B Troop was broken up in 1877, four field Companies

were formed, to which its sections were attached. It was not at that time intended that particular Companies should become permanently thus organized, but that changes should from time to time take place, the mounted sections being transferred to the newly selected Companies. Those first named were the 2nd, 5th, 17th, and 31st. In the month of May, 1885, the number was raised to six, viz., the 7th, 11th, 12th, 23rd, 24th, and 26th. In November of the same year the 17th was substituted for the 11th, which became a Fortress Company. Three additional Field Companies were provided for in the Estimates of 1887-8 by the return of the 17th and the conversion of the 37th and 38th. Four of these, viz., the 7th, 11th, 17th, and 23rd, are on a war footing of 188 of all ranks. These Companies form part of the 1st Army Corps. Four others, viz., the 12th, 26th, 37th, and 38th, are on a peace footing of 103 of all ranks, and are included in the 2nd Army Corps. The 24th is on special duty in Egypt. These eight are to be called respectively the 1st and 2nd Field Battalions.

In April, 1885, the Depôt Companies surrendered their numbers and were lettered. The 12th was converted into a Depôt Company and lettered A. The 35th to 40th, inclusive, were lettered from B to G; the three Indian Companies 41, 42, and 43 were lettered H, K, L; and the 23rd, or depôt of the Submarine Miners, M. A new or N Depôt Company was also formed. The numbers 12, 35, 36, and 37 were filled up by service companies.

The present classification of the Companies is, therefore, as under:—

13	Fortress	Companies.
2	Telegraph	,,
9	Submarine Mining	Companies.
4	Survey	Companies.
2	Railway	,,
9	Field	,,
12	Depôt	,,

The following brief sketch will give some details of the gradual development of the Telegraph work of the Corps, which led to the formation of the Telegraph Battalion.

At the outbreak of the Crimean War the Electric Telegraph Company offered its services and stores to the Government for the purpose of laying down a field telegraph in the Crimea. The offer was accepted, and some Sappers were sent to the Company's offices to receive a preliminary training in laying and working telegraph lines. This step may be taken as the first introduction of telegraphy into the Corps.

Two distinct systems were to be established—first, a cable line across the Black Sea; and secondly, the field lines at the front.

The submarine cable was laid by Messrs. Newall and Co., under the supervision of Captain C. Du Cane, R.E., and on completion was worked by Non-commissioned Officers and men of the Royal Artillery, under the joint control of Major Biddulph, R.A. (now General Sir M. Biddulph), and Captain Du Cane. Major Biddulph, in his report to the Minister of War on this work, stated as follows:—

"The surprising operation of laying out the cable from Varna to the Crimea has given to the world the experience of the longest submarine cable hitherto laid in one length between any two points, viz., 340 miles."

This was written in days antecedent to Atlantic telegraphy, and when submarine cabling was as yet only trying its wings.

The telegraphs at the front or field lines were entirely under the control and supervision of the Royal Engineers. The stores for the service were packed in two wagons, the covering or tilt of which was composed of pontoon boats. The length of cable provided was twenty-four miles, and consisted of copper wire enveloped in gutta-percha and rolled on drums. The men and stores arrived at Balaklava on December 6th, 1854, and were promptly landed. They were, however, unable to do anything towards laying down the lines until the snow, which at that time lay thickly on the ground, had melted. By March 7th they succeeded in establishing communication between head-quarters and Kadikoi. This was soon afterwards extended to Balaklava. The line was laid in a shallow trench and covered over, the work being performed by a detachment of twenty-five Sappers, under the direction of Lieutenant Stopford, R.E. Other lines speedily followed, and eventually twenty-one miles of cable were laid to the various points requiring connection.

The cable being only buried to a slight depth was frequently broken, and the Sappers not having had much experience in making sound joints, found it very hard to keep the communications in good working order. Their difficulties were increased by the fact, that the soldiers were in the habit of cutting out pieces of the cable wherever it became exposed, in order, after drawing out the wire, to use the gutta-percha tubing as pipe stems. Not unfrequently, also, a round shot in grazing along the ground would cut the line, so that the men were kept in constant employment repairing damages, as well as their limited skill and experience permitted.

Only two of the Sappers who had been trained as operators at the instruments by the Electric Telegraph Company landed with the stores. One of these was detailed for duty in the trenches, leaving only the other, Corporal Fraser, available for telegraphy.

This man had to teach certain selected Sappers on the spot, and was most successful in so doing, a body of very fairly skilled operators being shortly got together under his auspices.

After the close of the Crimean war all practical instruction in Telegraphy ceased. True, there was a telegraphic course carried on at the School of Military Engineering, but this training was necessarily little more than theoretical—useful in its way, but not to be compared with the knowledge to be obtained by a short service in actual practical work.

At length the desired opportunity for extending the instruction arose when the Government decided upon purchasing the entire Telegraph system of the country, and placing it under the control of the Post Office. That department soon saw the advisability of calling in the assistance of the Royal Engineers, and a Company (to be numbered the 22nd) was brought together and placed under the command of Captain Webber for duty under the Post Office. Details connected with this new branch of work will be found in the Chapter on Civil Railway and Telegraph Work. It is sufficient here to say that the value of the assistance rendered was so great that before long a demand was made for additional help, and the 34th Company was also detailed for Post Office Telegraphy. The benefit, from a military point of view, arising from such an extended practical field of instruction, has been well shown in the various wars that have since taken place, in which the services of the Engineers as telegraphists have been freely called into use.

Their work in the Ashanti war has already been detailed in Part I., Chapter XXIII, and need not be further referred to. The Zulu campaign in 1879 was the first expedition in which the Mounted Telegraph Troop took part. On the demand of Lord Chelmsford, after the disaster of Isandlwana, the C Troop was sent out under the command of Major Hamilton, R.E., but with only thirty miles of wire and cable. A branch line from the existing colonial system was run from Ladysmith to Dundee and Landsman's Drift, which exhausted the stock of material, and from that point signalling work had to be carried out by the C Troop and army signallers. A further detachment landed at Port Durnford soon after the battle of Ulundi with 100 more miles of wire, when a line was run from that point to within ten miles of Ulundi.

On the breaking out of the Transvaal War in 1881, a detachment, made up partly from C Troop, and partly from the Telegraph Companies, was despatched under the command of Lieutenant Bagnold, R.E., to Natal. They laid a line from Newcastle to Pretoria, which proved of great value during negotiations preceding the Convention with the Boers.

The work done by the C Troop during the Egyptian war of 1882, will be found referred to in the Chapter on the Royal Engineer Troops.

The following description of telegraph work during the Expedition to the Eastern Soudan in 1885, gives a graphic insight into the difficulties encountered in carrying out field operations. It refers to the day on which the disastrous attack was made on the force commanded by Major-General McNeill, and is shortened from an account written by Major Beresford :—

"On the 22nd a detachment under the command of Lieut. Lindsay, accompanied Sir J. McNeill's force, in its advance on the road to Tamai. The detachment consisted of 16 men with 12 horses, one air line wagon, fitted to take 96 drums of outpost cable, and one water cart. Major Turner, R.E., as Director of Telegraphs, was in charge of the arrangements. A vibrating sounder had been joined up at Quarantine Island, on the end of the overhead piece of line erected the previous day, and at daylight, as the force began its march, the outpost cable was connected with the far end of the same, and a line was laid along the ground by the side of the Indian square as it advanced. The cable was reeled off the wagon, and the detachment arranged it to lie evenly and covered it with sand as far as possible. Five and three quarters miles of cable had been paid out, when Sir John McNeill ordered a halt, and wired back his reasons for not going on to the place arranged for the zereba. One or two messages passed between him and the chief of the staff, at head-quarters at this time, *i.e.*, about 11 a.m. to 12 noon.

"As soon as the troops were halted zerebas were commenced, and about one o'clock the telegraph instrument was moved into one of them and fixed in a position near the entrance. The instrument, a vibrator, stood on some empty ammunition boxes. Most of the detachment were at this time about 200 yards outside the zereba preparing for the return march. At 2.45 the force was suddenly attacked by the enemy in great numbers. The fight lasted for about half an hour, and was at times hand to hand around and even inside the zerebas, which some of the enemy penetrated. At the first rush of the enemy the men of the Telegraph Detachment, hurried into the zereba, bringing a wagon with them. They immediately manned the breastwork, and assisted the Marines in the defence. The instrument had been knocked over and trodden under foot during the rush. As soon as the brunt of the engagement was over, a new instrument was joined up, and communication with Quarantine Island immediately established. General McNeill now sent a despatch by wire to the Chief of the Staff. This message, written by the General on Lieut. Lindsay's back as a desk, allayed the great anxiety felt in camp as to the fate of the column, and it was due to it being sent so promptly that reinforcements from Suakin were stopped. Two press messages, one for the 'Times' and the other for the 'Daily News,' were also immediately handed in by the special correspondents and despatched. While sending these messages, Lance-

Corporal Bent had on several occasions to leave the instrument to assist in the defence, when the enemy appeared to be closing round them again. During the afternoon between twenty and thirty other messages were sent out or received, several passing between General McNeill and the head-quarters. The work that the Telegraph did this day, the first occasion on which it has been used in the shooting line during an action by any European Power, has clearly demonstrated its great utility on the field of battle."

The Telegraph work of the Engineers in the Nile expedition of 1884-85 was not performed under such risks from the enemy, as were run by those employed in the Suakin line. Still it was an operation of much difficulty, and universally admitted to have been carried out in a manner that reflected the highest credit on those engaged in it. On the arrival of Colonel Webber, R.E., the Director of Army Telegraphs, he found himself hampered by a convention, which had been made between the army of occupation and the Egyptian Telegraph department, by which the work was to be all done by soldiers, whilst the charges were to be based on the ordinary tariff, the amount of the soldiers' working pay only being deducted. When an attempt was made to change this grossly unfair arrangement, and it was proposed to lease one wire to the Soudan, a demand was made for a rental of £120 a day for its use.

Up to the time of Colonel Webber's arrival, Lieutenant-Colonel Wood, R.E., had been in charge of the system so far as the work of the army was concerned, and he had already made arrangements to meet the immediate wants of the force working its way up the Nile. Unfortunately, instead of any assistance being rendered by the Egyptian authorities at the head of the Telegraphs there was the utmost amount of friction, and Colonel Webber records in his report, "the impossibility of working telegraphs during times of emergency, when cordial co-operation with mutual confidence and self-sacrificing work for the common good are totally absent." Fortunately this spirit of opposition only manifested itself in those who were at the head of affairs. The subordinate native employés showed great anxiety to serve the army, and their goodwill was everywhere apparent in spite of the discouragement emanating from their head-quarters.

The section of the Telegraph Battalion under Captain Bennet arrived in Egypt in September, 1884. It consisted of Lieutenants Tower and Stuart with 68 Non-commissioned Officers and men, and an equipment of 20 miles of line. This was followed in succession by the 1st reserve under Captain Bagnold with the balance of stores to complete 100 miles of lines and ten stations; the 2nd reserve under Lieutenant Hill of 37 Non-commissioned Officers

and men, with 160 miles of line; and the 3rd reserve under Captain Wood of 13 Non-commissioned Officers and men, with 176 miles of line. These last were Post Office Volunteers, who enrolled themselves for the war.

The existing lines were found to be in a most defective state, little having been done to them since their first erection fourteen years before.

"Some of the poles were eaten by white ants right up to the top, and when pushed down broke into several pieces. . . . Some of them had been stumped so repeatedly that in places there was hardly sufficient headroom for camels to pass loaded. Nearly all the wedge insulators were found with the porcelain broken and the wedges out. On nearing Halfa there were many bad joints, and often as many as three makers' joints in one span were met with."

The attention of the Telegraph Battalion was first turned to establishing a perfect communication between Cairo and Merawi, a distance of 1,130 miles, the existing lines being so very defective that during the first six months of the time telegraphic communication was required for the expedition no less that forty days were lost through interruption to the circuit. International susceptibilities prevented the lines during this time being taken out of the hands of the Egyptian department.

On September 18th the head-quarters of the telegraph section left Cairo, taking its advanced equipment, and from that date officers and men continued to be forwarded until only a small detachment was left to work the Cairo office. As the advanced parties reached the offices at Assiout, Assouan, Wady Halfa, and in the Soudan, the work was taken over, a military clerk assumed charge, and order was established. Repairs were set on foot as rapidly as possible, and some idea may be formed of the zeal displayed by the annexed statement.

A party under Lieutenant Hill, consisting of eleven men, repaired the main line between Assouan and Halfa in twenty-eight working days. During this time they did the following work :—

Number of poles reset	587
,, stumped.	207
,, renewed.	78
,, shifted	40
Bindings renewed	417
Insulators renewed	166
,, screws renewed	70
Dry joints cut out	25
Stays renewed	8

The great difficulty experienced was the want of transport, all available means being required for the conveyance of personal stores for the use of the troops. Colonel Webber reports that up to December 7th only a very small portion of his telegraph material had been pushed to the front. On that day he proposed that 160 miles of the lightest material, without poles, weighing under ten tons, should be sent forward, as information had been received that poles could be obtained about Merawi, and that Captain Bagnold should go forward with his detachment in three whalers, eighty miles of line being conveyed in two native boats, the remaining eighty miles to go south as transport became available. This was sanctioned, and the party started from Sarras on December 13th.

"Unfortunately, on the 14th, one of the native boats was swamped in a rapid, one man was drowned, and everything turned into the water, a considerable portion of the gear being lost. . . . . Not till the 27th did he, with Lieut. Hill and detachment, leave Halfa, and not before January 4th did they reach Ambigol, after having again swamped one of his boats."

Among the difficulties which had to be overcome in the course of the work was the animosity of the Hadendowas. Although they knew but little of the principle on which telegraphic communication was founded, they had an idea that it was an instrument of oppression, and was consequently to be destroyed if possible. They cut the wires, and at times tied the linesmen to the poles, and burnt them. They would sometimes place the ends of the cut wires into the ears of these unfortunate men, thinking that they might thus make them talk like the telegraph.

Then the scrutiny of private messages was a matter of urgent necessity, but of extreme difficulty. More than 6,000 messages in the Arabic language had to be examined whilst in course of transmission. The labours of the staff were greatly increased by the multiplicity of accounts, due to the diversity of the coinage current in the different districts, all of which had to be reduced to piastres. Amongst other impediments may be mentioned the fact that the Mudir of Dongola always sent his messages headed by a Chapter of the Koran.

Webber's report has the following interesting details connected with the desert march :—

"The telegraph work to and from Korti, during the months of January and February, was both exceptional in quantity and in importance to the army and to the public at home. Messages of such moment are rarely dependent, even in time of war, on so precarious a means of communication. The work and preparation described in this report was largely conducive to the results obtained, the main conditions being the

previous existence of a more or less permanent line of telegraph. On the 21st January the news of the battle of Abu Klea arrived at about 4 p.m., and for many hours the line was continuously occupied with despatches, private telegrams, and press messages. If anything this was exceeded when the despatches from El Gobat arrived, and again when the news of the fall of Khartoum reached head-quarters. On each occasion the charge of the office was taken by the Director of Army Telegraphs. The absolute control of the passage of all signals from Korti was obtained by closing the line to all forwarded messages until the General's despatches were ready. Orders were sent through the line for the telegraph officers and clerks in charge to be present to prevent the reading of signals at the intermediate stations, and to attend to the translators—in fact, for all concerned to stand at attention. The private messages conveying intelligence to friends followed next, so that newspapers should not be the first to announce disasters. . . . The manner in which the work was done in the straw office at Korti, with dust flying about from the wind, flickering and guttering candles, and all the conditions which can possibly be imagined antagonistic to good telegraphy, is beyond praise, and was most creditable to Sappers Nevett and Drake, the leading telegraphers. Mr. Oatway has specially drawn my attention to the good work at the Cairo office, by Serjt. Parish and Sappers Tomkins and Stevens on these occasions. The maximum amount of work done on one of these nights was 17,000 words."

Colonel Webber speaks most warmly of the reticence and discretion of the Sapper telegraphists in not promulgating news which passed under their notice, although the telegraph office being the only source of information, they were constantly assailed by pressing inquiries. He instances the fact that the recall of the Nile column, under General Brackenbury, was known to every telegraphist for two days before the camp and newspaper correspondents became aware of it.

It is worthy of record that in the years 1884-5 the Telegraph Battalion furnished strong detachments for three completely separate military operations at the same time: the Nile, the Suakin and the Bechuanaland expeditions. Some details have been given as regards the first two of these. The good work done in the third cannot be better shown than by quoting what was written on the subject by the "Kimberley Independent":—

"Among the numerous modern appliances that have revolutionised warfare, probably none has introduced more novel elements into the arena than the Field Electric Telegraph. The orders of the General, the movement of his troops, the warning of danger, the news of success, and above all, the calling up transport and distribution of supplies, are all facilitated thereby to such an extent that the effects of time and distance are completely altered.

"At the present time when the 'thin grey line' unites, for 230 miles, all the various elements of Sir Charles Warren's military force in Bechuanaland, and by junction with the Colonial system at Barkly West, puts that force and its General in immediate communication with His Excellency the High Commissioner at Cape Town, and Her Majesty's Government in Downing Street and Pall Mall at home, it may not be uninteresting to our readers to be made acquainted with some of the details of this work.

"The Telegraph Battalion of the Army at home is a branch of the Royal Engineers, and consists of two divisions, known as the 1st and 2nd Division Telegraph Battalion Royal Engineers. These two Divisions form the nucleus of 8 Telegraph Sections, 440 strong, when mobilised to a war footing, by the calling up of some 125 men from the Army reserve. Each section of 55 men is capable of erecting and maintaining 100 miles of telegraph with 8 offices, the clerking of these offices being mostly done by the non-commissioned officers and men of the 2nd Division, who in peace time are postal telegraph clerks at home.

"On the equipment of the expedition under Sir C. Warren, in November last, one such section of 2 officers and 55 men, with 100 miles of wire was detailed to accompany him. Arrived in this country, it soon became evident that such an amount would fall short of the Major-General's requirements, and early in January, an additional 100 miles was called for with another officer and 22 men, to assist in the construction. The wire was shipped forthwith, and duly received, but notwithstanding every effort to hurry them off, the additional detachment only arrived in time to take part in the construction of the last 50 miles of wire. The original detachment of 55 men put up their own 100 miles, and 70 miles of the second consignment in 29 working days, being an average of 6 miles a day. The total distance, augmented by local purchase to 225 miles (now working), was erected in 37 working days. The party was assisted by 13 native labourers; but on the other hand, had to find all their own duties as soldiers, *i.e.* men for pay duties, quartermaster's duties, officers' servants, cooks, guards, &c., and also for striking and pitching camp about every other day. They also dropped 2 to 3 men as clerks or linesmen at each 20 miles or so.

"Even from a commercial point of view, the Field Telegraph pays its way. By agreement with the authorities of the South African Telegraphs, the military system has been treated the same as the Natal, Orange Free State, and South African Republic telegraph systems, and messages are transmitted along all these to and from the military system at the usual South African rates. The result is that about £175 a month is being received for private messages, and paid into the Imperial Treasury, while a corresponding increase of revenue is of course being obtained by the other South African systems. Assuming that the original value of the field telegraph equipment was £10,000 (the whole equipment of the battalion at home is estimated at about £60,000), looked at solely from a commercial point of view, this gives a return on prime cost of about 20 per cent. per annum."

The railway work of the Royal Engineers has only been tried practically in the Egyptian war, but it has fulfilled the expectations formed of its utility.

The following extracts from the diary of Major Sidney Smith, R.E., will give a glimpse into the difficulties encountered by the 8th Railway Company when employed with Sir Garnet Wolseley's expeditionary force in 1882 :—

"August 28th. A large party of men was detailed to ballast up the line, and complete it over the bridge, while the remainder were employed at their trades, except the station staff, who were utilized in making up our first train, which consisted of twelve wagons, loaded with food and forage by the Commissariat Department. After several delays, Major Wallace and I started with it at about 8 a.m. He accompanied me as far as Nefiche, where we found the water tank plugged, and it was only by the exertions of Serjeant Pepperell, who had to strip and dive for it, that the plug was got out, and water could be obtained. At 9 a.m. we left Nefiche with six additional loaded wagons, and after passing over the new piece laid successfully by Lieut. Vidal's party, arrived at Mahouta at 10.20 a.m., amidst the cheers of the Guards and other regiments.

"August 29, 30, and 31. These three days the daily train was taken to Mahouta by Major Wallace, Lieut. Willcock, and myself. On the 31st the cutting at Mahouta was cleared (this had been completely filled in by the enemy to block the line), and I ran the train as far as Kassassin for the first time. . . . Lieut. Hulcatt took up the duties of traffic manager at Ismailia, and superintended the shunting and making up of the trains, the whole of the arrangements being under the supervision of Major Wallace, R.E., who was appointed 'Director of Railways.'"

"Sept. 1st. We now commenced running two trains daily, at 7 a.m. and 12 noon, each train averaging from 10 to 15 trucks. Our difficulties as regards water increased. In the second train, which I had charge of, three trucks ran off the line at Mahouta, on account of the sand on the line, caused by the cavalry horses going to water, which entailed a delay of 2½ hours, and, there being no telegraphic communication, a second delay was caused by waiting for the first train at Mahsamah station, the crossing place. On account of these delays and the weight of the train, it did not arrive at Kassassin until 9 p.m. On the return journey, the first train had come to a standstill for want of water, due to priming; and on meeting it, I had just sufficient water to push the two trains into Mahouta, where we got a sufficient supply of water casks to carry us both into Nefiche. We arrived at Ismailia at 2 a.m."

"Sept. 2nd. To-day Lieut. Vidal took up the 7 a.m. train, with Sir Garnet Wolseley and Staff on board. Unfortunately, a Frenchman was in charge of the engine, and either he did not understand the injectors, or they would not work; but the result was that on the return journey the

train came to a standstill about 2 miles west of Mahouta, and Sir Garnet and Staff had to make a forced march into camp. I was in charge of the second train, and although we did our best on meeting the other to get both trains into Mahouta, we could only get within a mile of it, when the engine of my train gave in for want of water. This occurred about 9 p.m. We then walked into Mahouta, and the Commissariat sent out five full water carts which, though sufficient for a light engine, were not nearly enough for one with two trains. I therefore telegraphed to Ismailia, and at 1 a.m., to our great joy, Serjt.-Major Loxton appeared on the third engine, and between us we got the trains into Ismailia, arriving there at 6 a.m. on the 3rd.

"Sept. 6th. We now commenced running three trains daily at 7, 9 and 11 a.m. The first train in charge of Capt. Scott got badly off the line at Mahsamah, owing to the pointsman splitting it, and it was not until Lieut. Vidal's party arrived at 9 a.m. that it was got on the line again. This train arrived at Ismailia at 2.45 a.m.

"Sept. 7th, 8th, and 9th. Ran four trains on each of these three days. On the 9th the action of Kassassîn took place, in which Lieut. Vidal and his party were introduced to Arabi's shells, and were under a hot fire for some time, but none of the party were hit—one shell (luckily a blind one) falling right in the midst of them. The ironclad train had been brought up a few days previously, and was just in front of our working party, and it was during that action that Lieut. Purvis, R.N., got his foot shot off. On account of the action there were no troops available to unload the last two trains, as they were all too done up; so, on applying for instructions, Sir Garnet Wolseley sent me an order that they were to remain there for the night. The fires were therefore drawn, and we all made ourselves as comfortable as we could in the sand under the trucks.

"Sept. 11th and 12th. An advance being expected shortly, it was reported that in all probability we should find a large amount of the permanent way destroyed, so a train was loaded up with heavy rails, sleepers, and stores complete, with tools, &c., for laying down 350 yards of new rail, if required, and on the 12th I went up in charge of this train, and on arrival at Kassassîn, placed it in position immediately behind the ironclad. During this night the whole of the troops at Kassassîn, excepting two Companies of Royal Engineers and the wing of a regiment which were left behind to guard the camp, struck their tents, and advanced towards Tel-el-Kebir.

"Sept. 13th. My men, having been platelaying all day, turned in till 4.30 a.m., when the ironclad, with Majors Wallace and Ardagh, and the material train, with myself and the platelaying party, started for the front. In a very short time we heard the sound of very heavy firing, and shortly after came within range of the enemy's shells, when it was thought prudent to stop. The ironclad was unable to fire, it being too dark to distinguish our own men from the enemy. During this I ran the material train back to Kassassîn, leaving the party behind, and changed the engine to the rear of the train in case we had to beat a hasty

retreat, and on returning, found the fight practically over, so both trains steamed up to the entrenchments, where we found a heavy gun battery built right across the railway. The parapet was made of rushes, interlaced with layers of clay, and although we had a company of Indian Sappers and Miners as well as our own men, who worked with a will, it took us two hours to remove the parapet, so that the trains could pass through, but luckily we found the permanent way intact. On arriving at Tel-el-Kebir station, between 8 and 9 a.m., the scene was almost indescribable: the station completely blocked with trains, full of the enemy's ammunition; the line strewn with dead and wounded, and our own soldiers swarming over the place almost mad for want of water, the result being that the water-tanks had been emptied, and the cranes for the time were useless. Prisoners were, however, soon set on to pump, and I took out an engine to bring in a train reported to be on the line two miles out, and which I found with the engine disabled by one of our shells, full of ammunition and wounded Egyptians. After a good deal of shunting, we made up a train to take the 42nd Highlanders and details, and, preceded by Major Wallace on the ironclad, we started for Zagazig. The ironclad was fortunate, and by dint of cutting through the main body of the army, which was marching in the same direction, arrived there in safety, but mine was not so fortunate. Being very long, it had to go slowly, and after dark a camel crossed in front of it, was run over, and threw three very heavy trucks badly off the line, the engine being in the rear. This effectually stopped further progress, and necessitated our remaining where we were for the night, about three miles from Zagazig, all the men being too tired, and it being too dark to work.

"Sept. 14th. At 4 a.m., with the addition of only six platelayers from the company (Lieut. Vidal and the remainder having been left behind to take charge of Tel-el-Kebir railway station), assisted by a working party of the 42nd, we got the trucks on the line in two hours, by which time another train, in charge of Lieut. Burn Murdoch, arrived from Zagazig and took us all in tow, Capt. Green, R.E., who was in the train, having walked in the night before and explained the situation. At 6.30 a.m. we arrived at Zagazig to find the place in our possession, including five trains and several engines. The majority of the staff here apparently had not time to run away, and finding we did not attempt to molest them, they resumed their duties, and assisted us in making up the trains and managing the engines. We, however, found it very hard to get any work out of them, but by dint of 'language' and persuasion we managed to make up a train about 3 p.m., in which I took on the 42nd to Belbeis. Other trains were made up to take regiments and stores towards Cairo, viâ Benha. At Belbeis we all bivouacked for the night, and sent the empty train back to Zagazig, in accordance with orders from Sir Garnet."

The railway work in the Eastern Soudan was divided under two distinct heads—first, the construction and maintenance of an 18-inch line connecting the various works in the vicinity of Suakin.

This was constructed and maintained completely by the railway Engineers. Secondly, rendering assistance to the civilians engaged under Messrs. Lucas and Aird in their proposed broad gauge line from Suakin to Berber. As regards the former Lieutenant-Colonel Wood reported :—

"Wide cuttings in hard coral have been carried across the island, and a causeway (with bridge) formed for about 500 yards for road and railway, which run along an embankment with many culverts, until the high ground is reached. Here a branch road and railway run to the north-west creek, all material having to be dug out from the high ground. The main line runs out along the ridge to the Handoub track, making a total length of $2\frac{3}{4}$ miles protected by strong redoubts of special design, each made in a day. Other branch lines and sidings make up a total of over five miles."

The work in connection with the line of Messrs. Lucas and Aird was by no means satisfactory. The introduction of the civilian element in a military operation is always a matter of difficulty. In the present instance it was rendered doubly so by the confusion that had taken place in shipping the railway material, which rendered it almost impossible to procure the necessary stores as they were wanted. The consequence was that in spite of all the assistance rendered most willingly and loyally by the railway Engineers, the work progressed but slowly. The Inspector-General of Fortifications, Sir Andrew Clarke, had from the first advocated that the line should be supplied and laid by the military Engineering strength at the time available, but he was overruled. It was thought that the necessary plant could be more readily and quickly supplied through civilian agency. The result proved that he was right. General Ewart, in a detailed report, dwelt on the difficulties that had arisen. On this Sir Andrew Clarke based a minute, of which the following extract contains the pith :—

"It was practically a dual system workable only by a species of compromise, which was both unscientific and uneconomical. Notwithstanding that the contractors had no previous experience of railway construction under the special conditions, it is certain that full use was not made either of the Royal Engineer Railway Company or of the trained Indian coolies. Nor was it practicable to obtain the full value of the services of the many experienced Royal Engineer officers present with the force, since it was not possible to give to these officers the position to which their Indian experience entitled them. . . . As regards the cost of plant and rapidity of delivery, I may mention that the material for the Nile Valley Railway, obtained without the intervention of an agent, was better in quality, and from 10 to 15 per cent. cheaper than that supplied for the Eastern Soudan, while it was

shipped quite as quickly and with a much smaller proportion of superfluous articles."

The journal of Captain Kunhardt, R.E., has many entries which bear out this view. He was ordered on April 9th to take charge of a Survey detachment to lay out and level for the railway and to look after the working at rail head generally :—

"April 12th. Rode out to rail head and inspected the plate-laying work; was much struck by the want of system and organization . . . April 16th. . . . Still the same delays for want of material. Complained to Mr. Blue about the want of system in the working; the fault lies entirely with the contractors' staff at the base . . . April 20th. The plate-laying going on very slowly from want of material . . . April 21 . . . . . commenced the siding at Handoub. Great delay was caused by this siding not having been put in before, as I suggested to the contractors. They will never be able to do any fast work until they introduce a regular train service, and have a proper organization. April 22nd . . . . The engines are showing themselves too weak for the work. They are unable to haul more than fifty tons up an incline of 1 in 90. More rolling-stock is required to keep the rail head supplied with even the small amount of material that is ready for dispatch daily from the base."

At last we read, on April 30th, that the railway was complete to Otao. This was the farthest point reached, as early in the following month the work was stopped. Captain Kunhardt thus describes what was done by the different departments :—

"The line was laid out by a survey party of Royal Engineers. The formation was cleared and levelled by the Madras Sappers and Indian coolies under Royal Engineer officers. The permanent way material was unloaded from the ships, and the trains were loaded and unloaded by coolies brought from India by and working under the immediate orders of R.E. officers. The line was lifted, straightened, and boxed up by coolies and military labour under the immediate direction of R.E. officers. The carts and mules, the muleteers, transport horses, and drivers were all supplied by Government. The only work done by labour supplied by the contractors was the running of the trains, and the actual fishing and spiking down of the rails, for which the navvies were receiving from 12s. to 15s. a day pay, work which might have been done quite as well by the native platelayers present on the spot for 1s. a day."

As a sample of the constant interruptions met with from the enemy, the following entry from Major Rathborne's diary may be quoted :—

"May 1st. Patrolling in the bullet-proof train all night protecting the railway. The enemy succeeded in lighting six fires of sleepers which they found lying along the line, while the engine was at Handoub

for water. By the time we got back we found the fires burning fiercely, and the rails quite hot. We also saw numbers of the enemy running along with the train; but when we stopped they disappeared. I got out with 4 Sappers, and having placed the rest of the party (11 in number) so as to protect the men at work, we succeeded in pulling off the burning sleepers, one by one, and by throwing sand on the rails I got them sufficiently cool to run the engine and wagons across to the next fire. In this way we eventually got all the fires under control, and established communication by putting in fresh sleepers and spiking up the line. Some of the fires had as many as 50 sleepers piled up in them. When the last fire was extinguished we found that the enemy (hitherto unseen, except for the moment) had commenced to replace the lighted sleepers on the first fire. A couple of volleys put an end to this. Left with the train at 4 a.m. to fetch Sir G. Graham, who was coming up the line to Handoub. The fires extended over about a mile of the line."

The work on the Soudan Railway, between Halfa and Sarras, was thus allotted: Managing Director, Major Scott; Superintendent of Works, Captain G. F. Wilson; Assistant Director, Captain Von Donop. Railway Staff Officers: at Halfa, Captain Blackburn, and at Sarras, Lieutenant Adair. The orders laid down that—

"The Managing Director is responsible for the general management of the railway, and that the line itself is kept in working order; that as many engines as possible are kept in proper repair; that all available carriages and trucks are kept at work, and also that all officers, N.C. officers and men, and civilians employed on the line, are distributed and worked to the best possible advantage.

"The Superintendent of Works is responsible to the Managing Director for the maintenance of a good road for the watering arrangements at the different stations, and generally for all the engineering works on the line.

"The Railway Staff Officers are responsible for order at the railway stations; they receive all applications for transport, and in concert with the Traffic Manager (Mr. Carnell) arrange the loading of trains."

We get a fair view of the work of the 8th Company on this line by the following extracts from a letter written by one of the officers:—

". . . Fifty miles more of line to be ready by the end of the summer is our job for the present. I think I told you that when we first came out we found 33 miles of line existing, and in workable order; and it was over this length that all the stores were carried, and at the end of which they were put into boats. This bit of line circumvented the second cataract, which is by far the worst of them all. Major Clarke had laid five or six more miles on, but it finished in the desert, so it was then of no use, and, in fact, was not used at all for the big advance. The first 70 miles which the

boats encountered after starting were by far the most difficult navigation, and the object of the extension is to circumvent these. After the troops had gone on, Scott got leave to continue the extension with what materials we had up here, and we pushed on quietly until we had completed up to the fiftieth mile—that is, seventeen miles more—when the material came to an end. This still landed us in the desert, but by this time the river had become so impassable for boats that they decided to use camel transport from rail head to Akasheh, a point on the river, above which the water was fairly clear, and for the last two or three months this has been going on. This was the state in which the fall of Khartoum found us. We have now got orders to continue the extension first to Akasheh, 28 miles, and then to Ferket, 20 miles. Luckily, the country is a most excellent one for its broad valleys, down which the line can be run without any preparation at all. There are five cuttings to be made, and on this we are now hard at work with Egyptian soldiers, and we hope to have them completed by the time the material arrives. Sleepers are coming in slowly, as they can supply them from Cairo; but of rails there are none in the country, so platelaying is absolutely at a standstill. Half a mile a day is what is proposed to be done, when we are in full swing; but if they can supply us with material at a quicker rate than this, the platelaying will also probably be quickened. . . . Our men have been working exceedingly well, but they are beginning to be touched up by the heat, and I am sorry to say there are a large number in the hospital. However, Scott stated from the first that our men would not be able to platelay in the summer, and 300 native platelayers are being sent us from India, and, I believe, also a native company of Sappers and Miners. . . . Scott has been looking seedy for some time, but he does not seem to get worse; of course, he has a great deal of work and a great deal of responsibility, and many things will occur to worry him, but he has driven the coach exceedingly well, and stands, I believe, very high in the opinion of all the Staff."

Such are a few samples of the work that was performed by the Royal Engineers during the war in Egypt. They tend to show the great development that has taken place in the connection of Engineering science with war, and the aptitude that has been displayed in its practical application. Year by year the demands on the Corps increase, and it may be hoped that they will be met in the future as they have been in the past.

This sketch of the Royal Engineer Companies may fitly be closed by an enumeration of the various bodies which have become affiliated to them. In the Militia the following three regiments have been converted into Engineers, and their training is such, that they may safely be trusted with a very large proportion of the duties usually falling to the lot of the Royal

Engineers—The Royal Anglesea, The Southern Submarine Mining Militia, and the Royal Monmouthshire.

The Volunteer movement from the first embraced the Engineer element, and this has from year to year grown more popular. It would not be right to single out any particular Corps for special praise, but it is generally recognized that amongst the Engineer Volunteers are to be found some of the finest regiments in that branch of the military forces of Great Britain. The several battalions are as follows: The Aberdeenshire, Cheshire, Gloucestershire (two battalions), Lanarkshire, Lancashire (two battalions), London (two battalions), Middlesex, Newcastle and Durham, and Yorkshire (two battalions). In addition to these, there are six Divisions of Volunteer Submarine Miners—The Severn, Humber, Tees, Falmouth, Forth and Tay Divisions.

In conclusion, some reference may be made to the native Sappers and Miners of India who have been frequently referred to in Part I. of this work.

No trained Sappers existed in that country previous to the year 1819. Engineers before that date had to improvise workmen and *matériel* as the occasion arose. Their military operations were in consequence sadly impeded. Civil workmen or Pioneer soldiers were ill able to fill the places of trained Engineers. This defect became at length so apparent that in the year 1818 the Court of Directors of the East India Company caused a number of men to be trained in the Engineer School at Chatham with the Royal Sappers and Miners. These they despatched to India at the end of the year to form the nucleus of the proposed new Corps. By Bengal Government General Order of February 13th, 1819, the resolution was notified forming a battalion of Sappers and Miners to be officered from the Corps of Bengal Engineers, the newly arrived trained Engineer soldiers to be appointed Non-commissioned Officers, and the Sappers selected from the Pioneer regiments. At present there are six companies of Native Sappers in the Bengal army numbered from 1 to 6, with two Depôt Companies, A and B.

The Corps of Sappers and Miners in Madras was formed from the 1st Battalion of Pioneers by General Order of the Madras Government of May 24th, 1831. This Order laid down the establishment and allowances, and decreed that it should be under the control of the Chief Engineer as to its employment, but that in matters of discipline and interior economy it should be under the Commander-in-Chief. It also numbers six companies, numbered from 1 to 6, with two Depôt Companies, A and B. Until recently all the Madras Companies were lettered and not numbered.

The Corps of Sappers and Miners in Bombay was formed under General Order of the Bombay Government of December 4th, 1826. This directed that a Corps of Sappers and Miners should be raised and trained by Engineer Officers, under instructions from the Chief Engineer, the European Non-commissioned Officers being obtained from European artillery and infantry, and the Sappers from the Native infantry regiments. There are four Companies distinguished by numbers, and one Depôt Company lettered A. The total force of Indian Sappers amounts to 3,000 men.

Since the extension of our possessions in Burma a Burmese Corps of Sappers and Miners has been established. It is attached to Madras, which supplies the European and Native Non-commissioned Officers, and is officered from the Royal Engineers. The Sappers are natives, one-half being Burmans, one-fourth Shans, and one-fourth Kachins and Karens. They number 170.

Still more recently the Eastern Battalion has been formed. This consists of four Companies—one is stationed at Singapore, which is the Head-quarters, one at Hong Kong, one at Mauritius, and one at Ceylon. The Companies at Singapore and Ceylon are recruited mostly from Malays, whilst that at Mauritius is composed of different races. The Hong Kong Company is not yet raised, but it will probably consist of men of the Chinese Hakka tribe. Major Whitmore is the Commandant, and Major Knight the Assistant-Commandant. The other officers are Captains Shellabar, Macdonogh, L. Jones, and Hodder, Lieutenants Mould, Bull, Laffan, and Speranza. The strength of the battalion is to be 200. A Company of Engineers is also in process of formation at Jamaica. This is to consist of 60 Non-commissioned Officers and Sappers besides Officers.

CHAPTER IV.

The School of Military Engineering.

Inefficiency of the Corps—Pasley's views on the want of proper instruction—Siege course taught at Plymouth—Proposals for a School of Engineering—Royal Warrant for the Chatham Establishment—The First Order—Improvement in Pontoons—Theoretical Instruction of the Non-commissioned Officers and men—Its Success—Architectural and Surveying Courses—Destruction of wrecks in the Medway—Blowing up the *Royal George* at Spithead—Depôt of the Corps removed from Woolwich to Chatham in 1850—Committee on the School in 1865—Synopsis of present Courses—Cardew's Electrical Inventions—Abney's Chemical and Photographic Inventions—Ballooning—Staff at the School—Formation of Royal Engineer Band—Mess Establishment—Portraits—Plate—Memorials in Rochester Cathedral.

The School of Military Engineering at Chatham unquestionably owes its origin to the persistent advocacy of the late Sir Charles Pasley, R.E., who was appointed its first Director. From the time he entered the Corps of Royal Engineers, Pasley had devoted himself to the question of improving the scientific status of that branch of the service. The experience he gained in war in the retreat to Corunna, and in the Copenhagen and Walcheren expeditions, showed him but too clearly how deficient in the proper knowledge of field engineering were not only the men of the Royal Military Artificers, but also the officers of the Corps. He has recorded his views as they were held by him in the year 1809:—

"The important department in which I had the honour of serving, was so imperfectly organized, that I considered the British army, though admirably adapted for battle, from the excellent discipline of the cavalry, artillery, infantry, and riflemen, or other light troops, was incapable of succeeding in a siege, though one of the most important operations of war, without either having recourse to the barbarous measure of incendiary bombardment, or without an enormous sacrifice of the lives of officers and soldiers in sanguinary assaults, which might be rendered unnecessary by a more efficient organization of the Royal Engineer Department, and especially in forming a well-instructed and well-disciplined body of engineer soldiers diligently exercised in all the operations of a siege, particularly in military mining; and also in the formation of military bridges. The better instruction of the junior officers of the Royal Engineers appeared no less essential, for at that time they were

not even taught the theory of the attack of fortresses at Woolwich Academy. . . . As for practical instruction, they had none; for they were sent on service without ever having seen a fascine or a gabion, without the smallest knowledge of the military passage of rivers, of military mining, or of any other operation of a siege, excepting what they might pick up from French writers, of which a striking proof occurred in Sir John Moore's retreat, when all the attempts to blow up stone bridges, to impede the progress of the enemy, failed in effecting complete demolition, with the exception of one only, which Lieut. Davy, a very promising young officer, succeeded in completely destroying, but at the expense of his own life, which he lost from not understanding the very simple precautions necessary to insure the safety of the person who fires the train of a mine. For my part I should not even have known how to make a battery in the attack of Copenhagen, the first siege in which I was employed, but for the information I derived from a French book on the subject."

Such were Pasley's views as gained from experience in war. Even before the expedition to the Scheldt took place, he had laid a paper before the Earl of Chatham, then Master-General of the Ordnance, drawing attention to the miserable inadequacy of the instruction given at the Woolwich Academy, and offering to submit to the loss of his commission if he failed to make good his charges against the system. Nothing came of this appeal, but in no way daunted, early in 1811 he took a similar step with the Earl of Mulgrave, the new Master-General, earnestly soliciting him to remove these defects in the instruction of the officers and soldiers of the Royal Engineer Department, from which he anticipated great disasters in case any important siege should be undertaken.

At this time the inefficient state of the Corps seems to have been very imperfectly known even amongst its own senior officers, and was unsuspected by the rest of the army. The younger officers of the Engineers were but too well acquainted with the fact. As Pasley records:—

"It had been deeply felt and lamented by those officers who had commenced their military career in the first war with the French Republic in 1793, and had afterwards served in Egypt and on other expeditions terminating in a less satisfactory manner. Young, or in the prime of manhood—full of enterprise and zeal, meeting and comparing notes together in the metropolis after the desultory expeditions in which they had served, and afterwards those employed in 1810 in the construction of the lines of Torres Vedras—meeting from time to time in some central spot, they excited in each other, and inspired their juniors with an *esprit de corps* and a devotion to the service of their Sovereign and country, that I do not suppose were ever exceeded. Capt. Charles Lefebure, who had served in the West Indies and in Holland, and had been the Commanding Engineer under Sir John Stuart in Calabria,

afterwards unfortunately killed at Matagorda, near Cadiz, was at first the most influential of these officers. He it was who first pointed out to me and other officers, his juniors, as early as 1805, the inefficiency of the Corps for want of well-disciplined and instructed Sappers and Miners, which fatal experience afterwards proved to be too true. Of those employed in the Spanish peninsula some years later, Capt. John Squire, a man of superior literary and classical, as well as of professional attainments, contributed most to keep up this noble spirit, and it was gratifying to me to find that our opinions on the state of the corps, and on the management of the war, always agreed."

Lord Mulgrave received Pasley's communications in a very encouraging manner, and seemed prepared to admit that there was much reason in what he urged. Encouraged by this, Pasley, who was at the time stationed at Plymouth, took the opportunity of carrying into effect, at his own expense, a system of practical and theoretical instruction for the junior officers of the Corps, and for the Non-commissioned Officers and men of the Company of Royal Military Artificers who were quartered there. The latter having volunteered to practise the operations of a siege after the close of their working hours, were taught the construction of gun and mortar batteries, parallels, and approaches, as well as the making of gabions, fascines, and other siege *matériel*. They also attended evening school, where they learnt practical geometry, plan-drawing, and elementary fortification, a course having been drawn up for the purpose by Pasley.

The result of this year's work was so satisfactory that it proved, beyond doubt, what additional value would be imparted to the Corps, especially to the Non-commissioned Officers and privates, by a thorough practical training in field duties. Matters were in this promising state when Lord Wellington wrote his letter of February 11th, 1812, from Freneda, in which he urged the addition of a Corps of Sappers and Miners to the Engineer's establishment, adding:—

"It is inconceivable with what disadvantage we undertake anything like a siege for want of assistance of this description. There is no French *corps d'armée* which has not a battalion of sappers and a company of miners. But we are obliged to depend for assistance of this description upon the regiments of the line, and although the men are brave and willing, they want the knowledge and training which are necessary."

The result of this letter, coming, as it did, after Pasley had been so successfully conducting his first experimental training at Plymouth, was prompt and decisive. He was summoned to London to submit his plan for the instruction of the junior officers of the Corps and the Non-commissioned Officers and men of the Royal

Military Artificers to Lieutenant-General Mann, the Inspector-General of Fortifications. That officer appointed a Committee, consisting of three Engineer officers, Lieutenant-Colonels Bridges, Rowley, and Bryce, to draw up a report on the scheme, for the information of the Master-General.

This Committee approved and recommended the adoption of the whole of Pasley's course for both officers and men, with the exception that they did not see the necessity for the latter to know anything of elementary fortification. At the same time, they proposed that the title of Royal Military Artificers should be changed to that of Sappers and Miners. This report reached Lord Mulgrave early in April, 1812, and on the 23rd of that month he obtained a Royal Warrant for an establishment for "the Instruction of the Corps of Royal Military Artificers, or Sappers and Miners,* and the junior officers of Royal Engineers, in the duties of Sapping and Mining and other Military Field Works."

Captain Pasley was appointed Director of the new Establishment, which was to be formed at Chatham, and he was given the rank of Major on the occasion. A party of four young officers and a strong detachment of Non-commissioned Officers and men were ordered to the station to be the first to undergo the course of instruction. The four officers were Edward Matson, Lancelot Machell, Francis Y. Gilbert, and Arthur Thompson.

On October 28th, 1812, Major Pasley issued his first order to start the new School of Military Engineering, or as it was then called, Royal Engineer Establishment. It ran as follows:—

"By virtue of His Royal Highness the Prince Regent's warrant, issued in the name and on the behalf of His Majesty, bearing date the 23rd April, 1812, whereby he has pleased to authorise an Establishment for the Instruction of the Corps of R. M. Artificers, or Sappers and Miners, and of the Junior Officers of the Corps of Royal Engineers in Military Field Works, of which Major Pasley has been appointed Director, the N. C. Officers and Privates of the Detachment who are, or may hereafter, be employed in learning the practical part of the field Duties, shall be classed as follows:—All N. C. Officers, not Qualified to act as assistant Teachers, shall be put upon the first Class allowance immediately on joining this Establishment, but the Privates shall be put on the Second Class until a sufficient period shall have elapsed to enable the Officers to judge of their merit, after which those who are recommended as the most deserving men, shall be placed on the first Class. Drummers not grown up shall be placed on the Third Class, as shall also be placed such Privates as are negligent and inattentive

* This cumbrous title was changed on March 5th, 1813. The words Military Artificer were abolished, and the Corps known simply as Royal Sappers and Miners.

to their Field Duties, or who are guilty of unsoldierlike conduct and irregularities. . . . . The allowance for the three Classes are as follows:—The 1st Class, 9d. per diem; the 2nd Class, 6d. per diem; and the 3rd Class, 3d. per diem.

"The temporary Field Works which will be constructed here merely serve for the Instruction of the men, so that after one set of men has been trained, the works erected by them will be pulled to pieces and the ground levelled, in order that new works may be constructed for the instruction of another Party.* As these works will, therefore, not be of any permanent use or benefit to the Country, like the works which the men will be employed in constructing in Garrisons, the allowances granted to men employed in this Establishment must be considered very liberal on the part of Government.

"It is intended that the whole Corps of R. M. Artificers or Sappers and Miners, shall go through the same course of duty at present performed by the detachment here, receiving the above-mentioned allowances, until they have learned their Field Duties, and everyone knows that in all trades and professions, a learner or apprentice cannot expect the same wages as he might claim when perfect in it. But at all other times when employed in work they will receive the regular working pay specified in His Majesty's warrant for the formation of the Corps with which the present warrant does not interfere, the Duties being perfectly distinct, &c. &c. &c.

"The men will parade for drill at 7 a.m., 10.30 a.m., and 2 p.m. The new detachment will commence Practical Geometry, Arithmetic, &c., to-morrow morning, and those who attend these studies shall be exempt from the morning drill. Those who are reported perfect in drill will commence Field Works on Monday morning." †

Thus the new school started, and from that day to this it has been maintained in an ever-increasing state of efficiency. What has been written will show how completely the paternity of the establishment must be attributed to Pasley. Still, as he himself was always most anxious to acknowledge, nothing would probably

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* Until of late years the work of levelling was performed by men of the Corps. Now, however, a party of convicts is employed for the purpose, as well as for other simple labouring work in connection with the School. Hence they have received from the men the soubriquet of "The Second Battalion."

† This order forms the first entry in the regimental order book of the Establishment. The following from the same source is also worth preserving:—"It is proposed that the Barracks shall be Illuminated this evening. The Offrs. are requested to illuminate their own rooms, taking care that the candles shall be placed at such a distance as not to injure the sashes. The N.C. Offrs. & Men will have leave this evening till eleven o'Clock, in commemoration of Lord Wellington's late Glorious Victory, in which the French Army, commanded by Joseph, the brother of Bonaparte, who styles himself King of Spain, was totally defeated; all their Baggage and Ammunition taken; all their Artillery, except one Howitzer, as also the whole of the treasure belonging to the Army." This refers to the battle of Vittoria.

have been done had he not met with the most cordial support from Lieutenant-General Mann, the Inspector-General of Fortifications. That officer fully recognized the necessity for the institution, and he also knew how well fitted for the post of Director was the man he had selected. Having placed him there, he gave him a free hand, and did not attempt to fetter his discretion in the mode of carrying on the necessary instruction.

There was, however, one slight exception to this freedom of action, which may be narrated in Pasley's own words :—

"When I first demanded pontoons, I could only obtain them on condition of making a pond on the low ground near St. Mary's Creek, on the left of Chatham Lines, lest some of the officers and men should be drowned in our pontoon practice, if carried on in the Medway ; but having once got possession of them, I launched them into the river at once, and General Mann pardoned my neglect in not making the pond."

The wisdom of Pasley's action in this matter was soon apparent : the behaviour of pontoons in still water is very different to what it would be in the rapid current of the Medway. The service pontoon of the time (1812) was a most inferior article, and as soon as it was subjected to the test of the rapids created under the arches of Rochester Bridge it failed ignominiously. This is Pasley's account of the matter :—

"It was not till we took the old pontoons up to the Rochester Bridge that their entire uselessness and inefficiency in more rapid rivers became evident, for one of them, when moored below one of the arches for experiment, without either men or stores in it, was sucked head under water by the violence of the current, broke its cable, and drifted away and sank, though it had been moored on the same spot where an efficient bridge was afterwards formed with my new pontoons."

The new pontoon which Pasley here refers to was his own invention. It was a double canoe of copper with a flat wooden deck. This was divided into two demi-canoes, and with its stores (no part exceeding $11\frac{1}{2}$ feet in length) was conveyed on a light two-wheeled carriage, not amounting to a greater weight than was taken on an ordinary tool cart. It was used at Chatham for a considerable time, until superseded by Blanshard's cylindrical pontoon.

The necessity for a thorough theoretical as well as practical instruction of the young officers had never been denied, and Pasley found no opposition to his views as regarded them. It was not so, however, in the case of the men. At the time it was commonly held by the older officers of the Corps that anything beyond the simplest practical work in the operations of a siege would be

wasted, and, moreover, would tend to make the men conceited and insubordinate soldiers, as well as lazy workmen. There is no doubt that up to this time the Corps of Artificers had to some extent laid themselves open to such a charge. Their military position was ill defined, their organization defective, and the system of keeping the Companies for many years at the same station employed on purely civil artificers' work, rendered them very difficult to deal with when called on to display the characteristics of good and steady soldiers. In a letter written to Major Pasley by Captain Squire, whilst employed in the construction of the Lines of Torres Vedras, that officer complained bitterly of the little assistance he derived from the Artificers under his orders. He stated that he found them almost useless, as they could not understand the simplest plan or section, and yet that it was necessary, for want of better men, to employ them, with artificers from other corps, as overseers and foremen, and he concluded by the sweeping assertion that efficient Engineer soldiers could never be formed out of a body of men so stupid and ignorant.

This letter may be taken as a type of the opinion then generally held as to the capacity of the men for receiving any instruction of a theoretical character. It has been already stated that the Committee of Royal Engineer Field Officers to whom Pasley's scheme was submitted for report, were opposed to his intention of instructing the Non-commissioned Officers and men in Elementary Fortification. This may be taken as a further proof of the feeling of the Corps in the matter. He was, however, so strongly convinced of the necessity for such instruction, and had such confidence in the capacity of the men to receive it, that, in spite of all opposition, he persevered in the plan. The result was not long in showing itself, and, by degrees, it was universally recognized that the theoretical training received at Chatham rendered the Non-commissioned Officers and men of greatly increased value for the active duties of war. They were first employed on service at the siege of San Sebastian. Here, although the method of attack adopted did not lend itself to the display of much of the knowledge they had attained, they incontestably proved themselves far more useful than any of the Royal Military Artificers previously employed in sieges.

A little later on they were better able to show what they could do. When the British army was sent to Belgium in the spring of 1815, before the Battle of Waterloo decided the fate of the campaign, the Duke of Wellington ordered the defences of the frontier of the Netherlands to be strengthened. In this task no less than 18,000 peasants and 2,000 horses were employed, under the direction of the Royal Engineers. In such extensive works it was

utterly impossible that the officers could maintain constant supervision. It thus came to pass that large bodies of workmen were left to the superintendence of Non-commissioned Officers, and even of privates, of the Sappers, each of whom was made responsible for laying out and conducting the work placed under his charge. From what we have already seen in Squire's letter to Pasley, written during the construction of the Lines of Torres Vedras, it would clearly have been impracticable to throw so much responsibility on the Artificers employed there. The result of the Chatham instruction was that the Netherlands' fortifications were superintended and carried out without complaint, and the Sappers showed themselves then, what they have always since continued to be, intelligent, trustworthy, and able men.

The establishment at Chatham having thus proved itself a great success, was left for many years under the charge of its original founder. At first, and, indeed, for a considerable period, the instruction was limited to field works, pontooning, escalading, and other cognate operations of war, combined with theoretical instruction in fortification and practical geometry. In the year 1826 a new departure was made, and the young officers received some training in practical architecture. This was an outcome of the fact that the charge of military buildings had been placed in the hands of the Royal Engineers on the suppression of the Barrack Board. On this point Pasley remarks :—

"Nor could they be more usefully employed in time of peace, because neither Engineer officers nor soldiers can be allowed to be idle, and therefore, when they are not attached to armies in the field, there is no alternative between making them take military duty by mounting guard, &c., or by employing them in public works."

A quotation may also well be made from the report of a Committee appointed in 1865 to inquire into the organization of the Royal Engineer Establishment at Chatham, which will be more particularly referred to further on. On the subject of building construction and other similar branches of instruction, the Committee observe—

"that Members of the Corps of Royal Engineers, as representing the Constructional Department of the army, may be required to apply the principles taught in these courses in the performance of their ordinary duties with an army in the field, as although the courses of Sapping, Mining and other Military Field Works are the essential duties of the Corps of Royal Engineers in the immediate presence of an enemy, the construction and care of Fortresses, including barrack accommodation for their garrisons, and the construction and repair of Roads, Bridges, and Lines of Telegraph, to facilitate the operations of an army, the construction and adaptation of Wharves, Storehouses, Cantonments,

Hospitals, &c. &c., and the ready compliance with all the constructional requirements of an army, are a no less important portion of their duties in the field, the performance of which will entail a knowledge by the Corps in the aggregate of the theory and practice to a certain extent of all of the above sciences, although not that every individual composing it should have attained a high qualification in each."

In 1833 a further addition was made in the Chatham course by adding instruction in surveying. It is singular that no attempt had at that time been made to teach surveying at the Woolwich Academy. Cadets intended for the Royal Engineers were (previous to being commissioned as such) sent to the Ordnance Survey in Wales, where they learnt the rudiments of the science under the tuition of the Surveyors. This system was not found to work well. The Cadets (as they still continued to be) were not under sufficient military discipline, and naturally rejoiced in shaking off the shackles of the schoolboy. They also found their studies much disturbed by the kind hospitalities of the neighbourhood, Boys as they still were, they furnished a great attraction to the families who resided in that remote district, as being the only representatives of the British Army. It was, therefore, decided that the instruction should be transferred to Chatham, and this was carried out by the order of Sir James Kempt, the Master-General of the Ordnance in February, 1833.

Colonel Pasley then established an astronomical observatory, and drew out a course which included the higher branches of surveying as well as practical astronomy. The officers appointed to be instructors were sent to Greenwich, where, under the auspices of the Astronomer Royal they had the opportunity of studying the system practised at the Royal Observatory. In 1835 an instructor in surveying was attached to the Woolwich Academy, and from that date the Cadets ceased to come to Chatham to learn the elements of the subject which were from that time taught them as a part of their Woolwich course. This change removed a great practical grievance. Hitherto Cadets for the Artillery had been gazetted to their commissions directly on leaving the Academy, whilst those intended for the Engineers remained for six months longer as such, during which time they were learning to survey, thus losing seniority, which told against them throughout their service. From this date Cadets for both Corps were gazetted simultaneously, and the Engineers joined at Chatham as officers.

In the year 1838 Colonel Pasley undertook the removal of the wreck of the brig *William*, which had been run into by a steamer, and sunk whilst at anchor off Tilbury Fort in May of the preceding year. She had on board at the time a cargo of 230 tons of coal. As the wreck lay in the channel of the river, and in the most

frequented track, it was important that it should be removed. This was in the first place attempted by a Mr. Kemp, whose object was to raise the sunken ship. In this he was not successful, and on his failure the Master-General and Board of Ordnance were applied to for the purpose of having the obstacle destroyed by gunpowder. They referred the matter to Colonel Pasley, who stated that the plan was quite feasible, and that it would be a most interesting experiment for the Corps to carry out. At the same time he felt bound to say that he thought it quite practicable to weigh the vessel by better appliances than had been hitherto used.

Pasley's report was acted on, and being a naval operation, it was entrusted to the authorities of Sheerness Dockyard, he undertaking that, if they should fail, he would blow the hull to pieces. The attempt was made, but, owing to the strength of the tides and the impediments constantly caused by vessels getting foul of the lighters, was not successful. Pasley was now called on to fulfil his promise, and gladly accepted the responsibility. The only record he could discover of such an operation having previously been carried out was in the case of the *Arethusa*, which had been destroyed at Barbados, in 1831, by Major Reid, R.E., with a party of Sappers under the charge of Colour-Serjeant Harris. That, however, had been a comparatively easy affair, as the wreck lay in only about four or five feet of water at low tide. It had, therefore, been practicable to apply a number of small charges close to the keel of the vessel. In the present case the depth of water and rapidity of the tide prevented such a plan being adopted. It was consequently decided to use only a few charges, but those of considerable magnitude.

The whole matter being as yet in the experimental stage the quantity of powder applied was largely in excess of what experience afterwards proved to be requisite. The first attempt was made in the spring of 1838. Captain Yule, with a party of thirty Non-commissioned Officers and Sappers of the 8th Company were taken to the place with their diving-bell and apparatus in a lighter which was moored over the spot. The first step in the proceedings led to a sad fatality. On May 21st, two days after their arrival, Corporal Henry Mitchell descended to the wreck in a Deane's diving-dress. The rope unfortunately got entangled in the rigging, the signals became undistinguishable, and it was impossible to raise him. When the diving-bell was lowered his dead body was found; by that time he had been twelve hours under water. The charges were fixed at 2,500 lbs. each, and on the 22nd it was arranged to fire them, but the pipe of communication gave way. Accidents of different kinds occurred

to defer the explosion for some days, and it did not take place until May 28th. It was then completely successful, although only one of the mines was fired. The second, not being required for the *William*, was, on June 5th, fired against the wreck of the schooner *Glenmorgan*, which had sunk several years before near the east end of Gravesend Reach, and the ship was totally destroyed.

In his reports on both operations, Colonel Pasley mentions the valuable assistance he received from Captain Yule and Lieutenant Hornby, of the Royal Engineers, as well as the Non-commissioned Officers and Sappers employed, and concludes by expressing

"the great gratification which his brother officers of the Corps of Royal Engineers at Chatham, and the N.C.O.'s and men of the Royal Sappers and Miners under his command as well as himself have had in being enabled, through the means of the Rt. Hon. the Lord Mayor and Corporation of London, to practise the art of mining under water on a great scale, and, as they hoped, to lay down rules in future for removing obstructions in the way of navigation with some degree of certainty. . ."

The cost of the two operations was £384 15s. 4d. The Lord Mayor and Court of Aldermen, on August 3rd, voted the Freedom of the City of London in a gold box to Colonel Pasley, besides addressing letters of thanks to the Board of Ordnance and the Lords of the Admiralty for the assistance they had rendered.

The principle adopted in firing these charges had been as follows:—Within a strong wooden buoy was enclosed a leaden cylinder three feet in diameter and six feet long, calculated to hold 2,500 lbs. powder. There were three holes on one side of the cylinder, the centre of which had a short leaden tube about two feet long fixed to it, closed at the bottom and perfectly water-tight, leading from the outside of the wooden buoy to the centre of the cylinder, but having no communication with the charge inside. The other two holes were for introducing the powder, after doing which they were hermetically sealed. A bursting charge of three ounces of powder was inserted into the leaden tube at the centre hole, which was then connected with the firing hose. This consisted of a small powder saucisson, about one-tenth of an inch in diameter, fixed in a flexible leaden pipe. The top of the pipe was secured to a small buoy and fired by means of a portfire.

The ignition of gunpowder by the voltaic battery had been practised on a small scale and under favourable conditions before Pasley undertook the demolition of the *William*, but the matter had not been sufficiently developed to render it advisable to apply the method to his operations at that time. He now, however, turned his attention to the question, and began a series of ex-

periments with a Daniell's battery of ten cells for the purpose of utilizing the principle both for land and submarine mines. In these he was much assisted by Captain Sandham, R.E., and Serjeant-Major J. Jones, R. S. and M. After many trials they first succeeded in firing an experimental charge of 1 lb. of powder at the bottom of the Medway on February 7th, 1839. This was followed by a second experiment on the 11th, when they fired 45 lbs., and on March 23rd they destroyed a model wreck at the same place, in each case from a distance of 500 ft. The principle being thus satisfactorily proved to be feasible, it was determined that it should be adopted in future operations.

It was not long before Colonel Pasley was again at work with submarine demolition, and this time on a far larger scale than before. The *Royal George*, a line-of-battle ship of 100 guns, had sunk at its anchorage at Spithead on the morning of August 29th, 1782. An attempt was made in the following year, by a person named Tracey, to raise the ship, but without success. In 1817 Mr. Ancell, one of the *employés* in the Portsmouth Dockyard, inspected the wreck in a diving-bell, but nothing was done as he reported—

"There can be no doubt, I think, of the state of the ship being such as to preclude the possibility of her removal either together or in detached parts."

In the years 1834, 1835, and 1836, Mr. Deane having invented the diving-dress, made several visits to the ship, during which he succeeded in recovering twenty-eight of her guns, besides a variety of interesting articles of minor importance. Thus the matter stood when Pasley's successful removal of the brig *William* drew attention to the possibility of similar action with respect to the *Royal George*. The position occupied by the wreck had for half a century proved of the gravest inconvenience to the anchorage at Spithead, and she had only been permitted to lie there so long from the apparent impossibility of moving her. Now, however, the effort was to be made, and Colonel Pasley was armed with complete authority to carry it out. He estimated the cost of the operation at £2,500, against which should be set the value of such ordnance and other stores as might be recovered. He had made many experiments with the diving-bell with a view to this work, and had much improved its form. In this he was assisted by Captain M. Williams, R.E., and Serjeant-Major Jones, R. S. and M.

All being now ready the operation began in August, 1839. The detachment, taken by Pasley from Chatham to Portsmouth, consisted of Captain Williams and Lieutenant Symonds, with a party of

Sappers under the charge of Serjeant-Major Jones. They were divided into two squads and placed on board separate lumps, Lieutenant Symonds being at the head of one party and Serjeant-Major Jones of the other. Thus a friendly rivalry was set up, which added much to the interest of the proceedings. It was a coincidence that the first successful charges were fired on August 29th, being not only the fifty-seventh anniversary of the sinking of the ship, but also, curiously enough, falling on the same day of the week (Thursday). These explosions were effected by means of Bickford's fuze, but the voltaic battery was soon after brought into play, and it may be noticed that the first important charge of powder ever exploded by this means in deep water, was fired by Colonel Pasley's youngest son, George Malcolm Pasley, then only seven years old. This consisted of 260 lbs. and was very successful. Several other mines were fired before it was necessary to suspend operations for the winter, and considerable progress was made in the demolition of the ship. The diving-bell had soon been found too cumbersome for convenience, and was abandoned in favour of Deane's diving dresses. The Sappers soon became most expert in their use, and were able to remain below for a considerable length of time at a stretch. It will not be possible to give all the details of this most interesting operation, which spread over five seasons, from 1839 to 1843. During the first two, Lieutenant Symonds was the executive officer in charge, but in 1841 he was relieved by Lieutenant Hutchinson.*

At the outset civilian divers were employed until Sappers had been sufficiently trained, but by degrees they were dispensed with as the latter became proficient in the duty. Colonel Pasley used always to say that he never had the smallest difficulty in obtaining the services of any number of Sappers on any duty, however hazardous it might appear, although at that time none of the Dockyard men, whether seamen or riggers, were willing to volunteer as divers.†

The work was really extremely dangerous, and the gallant Sappers had many narrow escapes. On one occasion John Skelton had been down to place a charge of 60 lbs., and was coming up again, when, before he reached the surface, the mine was prematurely fired. He was stunned by the shock, but, having been got on board the vessel from which the work was being carried on, he was happily restored. On another occasion a pig of ballast, weighing 3 cwt., fell upon the diving helmet of Corporal Jones,

* This officer was afterwards unfortunately killed at Holyhead whilst in charge of the blasting operations there.

† Letter from Major-General C. Pasley (Colonel Pasley's son) to the author.

which was greatly crushed in, but fortunately not sufficiently damaged to admit water. Roderick Cameron nearly lost his life through the bursting of the air pipe, but the mishap was discovered in time to raise him to the surface. These are only samples of the different kinds of accidents to which the men were exposed.

On Saturday, November 4th, 1843, the last descent was made by the divers, after which the Master-Attendant of Portsmouth Dockyard reported that the ground where the wreck of the *Royal George* had formerly lain was now clear and quite as fit for the use of Her Majesty's ships as any other part of the anchorage of Spithead. During the operation forty-three guns were recovered. As fifteen had been raised in 1782 and twenty-eight by Mr. Deane in 1834-5-6, there remained fourteen still unaccounted for, which had become too deeply sunk in the mud to be reached. In addition to the guns, upwards of thirty tons of metal (copper, lead, and iron) and 60,000 cubic feet of timber were raised, whilst 53,000 lbs. of powder were expended in the demolition.

The destruction of the *Royal George* was followed by that of the *Mary Rose*, which had been sunk as far back as the year 1545, as detailed in Part I., Chapter II.

Until the year 1850 the Royal Engineer Establishment was kept separate from the depôt of the Corps. A recruit upon entering was sent to Woolwich, where the Royal Engineer Depôt was fixed under the Brigade-Major. There had been much discussion as to the advisability of continuing the two establishments, but nothing had as yet been done. Colonel Pasley states that the reason given for retaining the Woolwich depôt was, that had it been brought to Chatham, the Brigade-Major would necessarily have been removed to a greater distance from the Inspector-General of Fortifications and the Assistant Adjutant-General, with whom his duties required frequent intercourse, and he adds—

"but when the North Kent Railway, now in progress (1848), shall be extended to Chatham, this official inconvenience will be done away with."

Pasley was right in his views, and in 1850 a Warrant was issued abolishing the Woolwich depôt and combining it with the Engineer Establishment at Chatham. From that time the purely military training and instruction of the recruits for the whole Corps at home and abroad, including India, as well as that of Companies on their return from foreign service, and also their final preparation before going abroad, were placed under the supervision of the Director who, for those special duties, was assisted by an officer

called the Field Officer for Military Discipline, with a regularly organized staff.

As already stated, in the year 1865 a Committee was appointed to report upon the state of the School and to suggest improvements. The president was the Quartermaster-General, Sir Richard Airey, under whom were the following members:—Major-General F. Abbott, R.E.; Major-General H. Sandham, R.E.; Colonel Sir J. W. Gordon, R.E.; Colonel Sir J. L. A. Simmons, R.E.; Colonel J. S. Addison (Royal Military College, Sandhurst); and Colonel J. Hawkins, R.E.

This Committee, after an exhaustive investigation, found but little to which they could object. Their words are:—

"With regard to the several branches of Science to be studied, the Committee having had under consideration the course at present followed at the Royal Engr. Establishment at Chatham, are of opinion that those courses are admirably arranged and require but trifling modification."

At that time 140 days were given to field works, 230 to surveying, 140 for the architectural course, 20 for siege plan and project of attack, and 40 for telegraphy and demolition. There were also optional courses for photography and chemistry. Some of those who showed special aptitude were taken on a tour to visit the large engineering works of the kingdom. The only alterations of any importance recommended by the Committee were an extension of the field work course to admit of sand modelling being practised, a better site for pontoon exercise, and a concentration of the workshops. One of the results of these recommendations has been the acquisition of land at Wouldham, where pontooning is now carried on under very advantageous conditions. The Committee further remarked that—

"the fact of a steam engine being constantly at work at the Establishment, would allow of the officers receiving some practical instruction in its management."

This recommendation raises a smile when it is considered that at the present time no less than ten steam sappers are in constant employment, and every branch, not only of stationary, but also of locomotive, driving, and other railway work is taught thoroughly. Another result of the report was the addition of a Brigade-Major to the staff of the Director.

In the year 1869, by order from the Secretary of State for War, the title of the Establishment was changed into "The School of Military Engineering," and that of its head from Director to Commandant.

The result of the various developments in the course of instruction at Chatham has been that at this moment it is unquestion-

ably the leading military scientific school in Europe. It undertakes the training, not only of the officers and men of the Royal Engineers, but also of the other branches of the army and auxiliary forces. This will be seen from the following synopsis of the work carried on.

1. Field Fortification, including field defence, siege works, mining, bridging, railway work, and demolitions.

The full course on these subjects is only intended for the Royal Engineers, but there is a shortened course which varies in each case, and is for the use of the following branches of the service: —

Infantry officers, who, in a period of thirty-five days, are taught the application of practical geometry, hasty intrenchments, field works, the defence of posts, siege works, hasty demolitions, camps, bivouacs, military bridges, &c.

Cavalry Pioneers, who, in a course of fifteen days, are taught the use of tools, the making of fascines; hutting and thatching; water supply, including making filters, the use of Norton's tube wells, and the best arrangements for watering horses and cattle; the defence of a post, the demolition of arches, bridges, railways, and telegraph lines; and the construction of military bridges.

Infantry Pioneers, who pass through a longer course of fifty-five days, and learn, in addition to the above, the making of gabions, the use of intrenching tools, the making of shelter and siege trenches, the construction of obstacles and of redoubts, railway work, the formation of encampments, and escalading.

Besides these courses, there are others for Non-commissioned Officers, Assistants to Garrison Instructors, and for Railway Volunteer Instructors. An advanced class in railway work is also given to officers and selected men of the Corps, including fitting and lathe work, the driving of engines, whether stationary, locomotive, or steam sappers, stoking, and the management of steam boilers.

The other advanced classes are in modelling, wood-cutting machinery, and in land-mining and the use of the electric light in field operations.

2. Survey.—The work performed at the Survey School may be ranked under two heads, viz., Technical Surveying and Military Topography. The former consists of instruction in geodesy, astronomy, meteorology, trigonometrical surveying, chain and road surveying, and defilade, or the application of permanent works to sites. The Military Topography consists of military surveying, military sketching, and elementary reconnaissance, both road and district, also eye sketching and the drawing of sections. The course for Engineer Officers extends over 154 days, and includes the whole of the above. That for Infantry Officers is confined to Military Topography, which only lasts for thirty days.

For Non-commissioned Officers and Sappers of the Survey Companies the course lasts 180 days, and embraces all the operations of practical surveying, including chaining, observing angles, traversing, calculating areas, levelling, and contouring; also reduction of base line, protracting angles, and triangulations, with other details.

3. Electricity.—This is one of the most important courses in the School, so much electrical work having of late years been thrown on the Corps in connection with the Post Office, and the Submarine Mining branch.

It commences with an ordinary course of fifty-four days, in which the subject is taught elementarily, including the making-up and testing of batteries, galvanometers, and resistance coils, measurements of resistance, firing of mines, the electric light, signalling, and the use of various kinds of telegraph instruments. For those who desire to go further into the subject, a more elaborate course follows, including all the details for land mines (submarine mining forms a separate course), and the electric light.

The Electricity school is placed in the St. Mary's Barracks, where the different branches of instruction are carried on in separate casemates, the solidity of the building being of great advantage to insulate the numerous instruments and the consequent currents. Here are to be found all the latest inventions and improvements in telephones, microphones, and vibrators—as well as in electric lighting—for military purposes. Amongst these is the Mangin projector, which is catoptric, and completely supersedes the dioptric projectors, formerly produced by Messrs. Chance, of Birmingham. The Mangin has a beautifully-designed mirror ground to two different spherical curves on its face, so as to obviate spherical aberration. The result is, that this mirror gives a nearly parallel beam of light, and is extremely powerful at long distances. It is, however, very costly, and the present Chief Instructor in Electricity, Captain Cardew, R.E., has introduced a simpler form of mirror bent spherically, which proves an excellent substitute as an ordinary search light. The advantage of his modification is, that it can be manufactured at a cost of £7, whilst the Mangin is valued at £120. The process consists in bending a sheet of plate glass, whilst in a pasty condition from heat, over a mould, which gives it an approximate spherical or roughly paraboloidal surface. A certain amount of grinding and polishing is afterwards applied. It is manufactured by Messrs. Chance, of Birmingham, and is in great demand as a ship's light.

The mention of this leads to a short recapitulation of some of the other inventions and improvements which have been introduced by Captain Cardew.

First.—His Vibrator system of Telegraphy. Its utility for military purposes has been demonstrated in more than one of our recent campaigns. During the Nile expedition, at the most critical period, just after the fall of Khartoum, a serious fault occurred near Dongola. Communication was, in spite of this, maintained by the vibrator system for nearly forty-eight hours, until the fault was removed, although no signals could be obtained from any other instrument. It was also successfully worked for a considerable time on several lines consisting of bare wire laid on the ground without insulation, owing to the want of poles, &c. In other cases of faulty lines it also proved most valuable. The message announcing the victory of Tel-el-Kebir was sent from the field of action by a vibrator. It also did good service in working through broken-down lines on the Postal Telegraph system after the great snowstorm in the winter of 1886. The vibrator derives its extreme sensitiveness from the use of the telephone as a receiving instrument, and in order that the signals should be best adapted for this receiver, the currents are not steady in each signal, as in the ordinary systems, but are broken up into a succession of impulses of current which, when received on the telephone, cause it to give out a musical note of corresponding pitch. This is effected by the use of an instrument called a Vibrating Transmitter at the sending end, somewhat similar in principle to the ordinary electric bell. This forms a divided circuit with the line, and the impulses to line are thereby considerably strengthened over what they would be if the battery current were simply made and broken by an instrument not in the circuit, as is the case in the Elisha Gray vibrating system. The invention consists in the combination of the instruments for the purpose, and in the form of transmitter used.

Second.—"Separators." These are simple instruments consisting of a combination of an electro-magnet and two condensers. They enable one line to be used for two separate circuits—one with vibrators and one an ordinary Morse circuit without interference, and thus double the working capacity of the line.

Third.—"Voltmeter." Captain Cardew was awarded the Gold Medal at the Inventions' Exhibition for this instrument. It is on an entirely new principle, differing from other measuring instruments in that it works by means of the expansion of a fine-stretched wire heated by the current. It is now largely used in electric lighting, being the only instrument that is practically adapted to the measurement of the volts of alternating currents.

Fourth.—System of winding the field magnets of dynamo machines to enable several arc lights in parallel to be burnt off one machine without interference. Owing to recent improvements in dynamos this is not practically of so much utility as it was when

brought out, still many War Department machines are wound in this way. The principle is that of dividing the circuit as far back from the lamps as possible, the series coils of the field magnets being wound with several wires in parallel instead of one thick wire, and their ends brought to a commutator, by which they can be connected to separate lamps or all together to one.

Fifth.—System of testing dynamos for efficiency. This is always used for War Department machines, as also by many private makers, both in England and on the Continent. It depends on the reversibility of the dynamo, *i.e.*, if power be applied to it, it will give off current, while, if current be supplied, it will give off power. Two machines are connected by a short belt over their pulleys. One is supplied with current or electric power, which can be very accurately measured; it gives out mechanical power to turn the other. This, in its turn, is made to supply current, which again is accurately measured, it may be, by the identical instruments used for the measurement of the power supplied to the first machine. Thus all measurements are electrical, and the combined efficiency of the pair of machines is exactly determined.

Such are a few of the leading inventions already developed by Captain Cardew, who may, not inaptly, be termed the "Edison" of the Royal Engineers.

Varied courses are laid down for the Non-commissioned Officers and Sappers, according as they are intended for Telegraph, Field, Fortress, or Railway Companies. Signalling with flags, lamps, and heliographs is a branch of instruction attached to this School.

4. Photography and Chemistry.—This course includes the use of wet and dry plates, printing in silver and platinum, papyrotype, and reproduction of plans, platinotype and the preparation of paper, printing, and mounting.

The mention of papyrotype leads to the introduction of the name of Captain W. de W. Abney, R.E., the founder of this school—a man of European reputation in the sciences of chemistry and photography. Abney's first studies in these branches had been carried on in India, and he there earned a very high reputation for his discoveries and developments, especially in the art and practice of photography. When it was proposed to add a photographic course to the Brompton School, the name of Abney at once occurred to every one as the man to arrange and superintend the instruction. He it was who built the laboratory and laid down the chemical and photographic system as now carried out. It seems hardly necessary to dwell on the achievements of a man so generally known in connection with these subjects. From

the time he took over charge of the school, in 1871, his name began to be as well known in England as it had previously been in India. His principal achievements whilst at this post were the invention of the photolithographic process called Papyrotype, for which he was awarded a medal at the Inventions' Exhibition. He invented the process adopted at all the stations for observing photographically the Transit of Venus, in 1874, and instructed the English observers in the mode of working the principle. He, at the same time, took personal charge of the Thebes party. He has invented a level and clinometer for the use of officers when on reconnaissance duties, well known as Abney's Level, and he greatly developed the heliotype. In 1876 he was elected a Fellow of the Royal Society, and in 1882 was awarded the Rumford Medal, the blue ribbon of that Society. This was granted to him for his discovery of the composition of the dark radiations of the solar spectrum, and also for that of the absorption of light in colourless fluids, in which latter he was assisted by Major-General Festing, R.E. He has been awarded the medal of the Photographic Society for his numerous discoveries in that art, especially as regards instantaneous photography. In fact, he has been the pioneer in improving the principles and developing the theory of photography ever since the time of Sir John Herschell. In this branch he has received medals for exhibits in London, Paris, Brussels, Bengal, and many other places. He was selected as one of the British delegates to the International Congress, assembled at Paris in 1884, for the determination of electrical units, and he was also a member of the International Astronomical Congress, held in the same city, in 1887. The above are only a few out of the many different branches of science in which Captain Abney has earned distinction.

5. Lithography.—This includes printing in black and colour from stone and zinc, transfer of work to zinc and stone, photolithographic transfers, drawing and lettering on transfer paper, stone or zinc, and Papyrotype. The mention of this latter leads to a few words on the process of Serjeant-Major Husband, R.E., the Non-commissioned Officer Assistant to the Lithographic School. This, which he terms the Papyrotint, is a discovery of his own, and for it he has received an honorarium of £100 from the Government. It is a modification of Abney's improved Papyrotype process, and is specially adapted for the reproduction of subjects in half tone. Its advantages over other methods of photolithography in half tone is, that a transfer can be taken in greasy ink, to be re-transferred to stone or zinc direct from any negative, however large, without the aid of a medium, the grain or reticulation being obtained by the introduction of common salt in certain

specified proportions, first into the gelatine and glycerine bath in which the paper is originally prepared, and also into the sensitizing bath in which it is placed when required for use. This salt becomes dissolved, and in disappearing produces the desired effect of granulation necessary for the formation of half tones, which had previously been so difficult to obtain.

6. Submarine Mining.—In this course officers and men are taught knotting and splicing, jointing, hydraulic testing, loading, connecting up the various kinds of mines, slinging, laying out, and raising mines (this is also carried out in deep and rough water at Portsmouth), all the details of fitting and testing, and also practice in rowing and sculling.

A short course is given on these subjects to Officers, Non-commissioned Officers and men of the auxiliary forces who are Submarine Miners.

There is also a course of instruction in diving, both in shallow and deep water, and another in repairing electrical instruments used for submarine mining.

7. Estimating and Building Construction.—This course includes the quality of the various materials used in building operations, the science of engineering and building construction, sewerage, drainage, ventilation, gas and water supply. Also designing for military buildings, such as barracks, hospitals, stables, &c., measuring and estimating, and a course of instruction in architecture.

In this branch of the School Non-commissioned Officers and men of the Cavalry and Line are trained to become Pioneer Serjeants in their regiments. Officers of the West India regiments also go through a course for work on the Gold Coast. All the Military Foremen of Works receive their training here.

8. Ballooning.—The history of military ballooning dates back into the last century. The French Revolutionary armies were the first to attempt any practical use of the science for the purposes of war. At Maubeuge, Charleroi, and Fleurus, balloons with their attendant equipment of men and *matériel* accompanied the French forces. At the latter battle the height of 1,300 feet was attained, and the results were at the time reported to be very satisfactory :—

"J'ai vu a Paris et a Meudon le Capitaine Coutelle, le même qui le 17 Juin, 1794, montoit le ballon qui dirigeoit la merveilleuse et importante reconnoissance de l'armée ennemie à la bataille de Fleurus accompagné d'un Adjutant Général. Je lui ai parlé de son voyage aërien pendant cette bataille si decisive par suites dont le succés est dû en partie a cette expedition aërostatique d'après le jugement unanime des personnes impartiales. Coutelle correspondit avec le Général Jourdan,

Commandant de l'armée Française par les signaux de pavillon convenus." — (Dr. Mier's Journal, quoted in General Money's pamphlet, 1803.)

This incident is referred to by Carlyle in his "French Revolution" in the characteristic style of that writer: —

"Hangs there not in heaven's vault some prodigy, seen by Austrian eyes and Austrian spy-glasses, in the similitude of an enormous wind bag? . . . By heaven answer spy-glasses; it is a Montgolfier balloon, and they are making signals. Austrian cannon battery barks at this Montgolfier . . . harmless as dog at the moon."

Jomini thinks that the results obtained by the French in these operations were not worth much, and that they must have been grossly exaggerated at the time. Be this as it may, the matter does not seem to have been pushed, and the aërostatic corps, after an existence of some five or six years, was abolished.

The next important occasion on which an attempt was made to utilize balloons for the purpose of reconnaissance, was by the French in the Franco-Austrian War of 1859. At this time the service was entirely in the hands of civilians, and the results were not of much value. The difficulties attending the transport and inflation, coupled with the meagre results obtained, showed that much advance was necessary before the principle could be made of any great use in war. We now come to the first attempts made in England to solve the question.

At the time of the Trent affair, Lieutenant Grover, R.E., entered warmly into the subject with the object of providing the expeditionary force with something in the way of a balloon equipment. With this view he consulted the Greens who, father and son, were both skilled aëronauts, and after having obtained much practical information from them he put forward a memorandum sketching out his scheme. This paper was sent through the Deputy Adjutant-General, Royal Engineers, to the Commander-in-Chief, by whom it was forwarded to the Ordnance Select Committee. Here, as might be expected, the usual dose of cold water was administered, without, however, the desired result of suppressing the troublesome Engineer. Meanwhile, Grover received support from another source.

The Americans had realized the value of the idea, and the Northern armies in their Civil War were striving to work out the problem under the stress of actual campaigning. Captain F. Beaumont, R.E., had attached himself as an amateur to McClellan's force, and whilst with him took a deep interest in the ballooning experiments then carried on, and himself shared in the practical work. On returning to England he joined Grover in his struggle, with the result that both were attached to the Com-

mittee as Associate-Members. In this capacity experimental balloon ascents for reconnaissance purposes were carried out at Aldershot on July 14th, 1863, and at Woolwich on October 6th of the same year.

Prior to this, however, Grover had read two important papers on the subject at the School of Military Engineering on April 23rd, and on November 14th, 1862, which helped greatly to arouse the interest of the scientific thinkers of the army. These were followed later by a lecture given by Captain Beaumont at the Royal United Service Institution on February 5th, 1864, in which he gave an interesting detail of his American experiences. Still the matter could not be said to have emerged from the stage of theory, and remained quiescent and almost dormant until the time of the Ashanti war. Then the question of providing a balloon equipment once more came to the front. Mr. Coxwell, the leading aëronaut of the day, was called on to submit a scheme with estimate of cost. This, as might well have been expected, broke down. The expense would have been enormous, the equipment entirely unsuited to the purpose, and the time required to provide even this unsatisfactory service too great to render it of any possible use. The subject was therefore dropped, but having been once practically raised, was not allowed to sleep. Up to this time the main points that had been under consideration between Captain Grover, Captain Beaumont, and Sir F. Abel had been—1st, A mode of producing hydrogen in the field by some portable apparatus; 2nd, A suitable material for the envelope of a war balloon. In 1870 Captain Grover had been replaced on the balloon committee by Major Scratchley, who was working on the question when the above-named attempt was made to adopt the system for the Ashanti war. Since that time numerous names have been added to the list of those who have helped to bring the matter into its present satisfactory state. We have seen that Major Scratchley replaced Captain Grover on the committee. At a later date Captain Beaumont was also replaced by Captain Watson, and thus composed the committee pursued their labours with patient completeness. They carried out a very elaborate series of experiments on the generation of hydrogen with a view to its being readily obtainable in the field, and they also tested a vast number of different materials in the search of that best suited for the construction of the balloon. By degrees others joined in the work. Lee, Elsdale, Macdonald, Mackenzie, Phillips, Close, Heath, and Jones, can all be quoted as having at various times laboured at the question; whilst outside the Corps, Major Templer, of the Militia, and Captain Trollope, Grenadier Guards, have rendered most valuable aid. Indeed, it may well be said that it is largely owing

to Major Templer's initiative that the subject was ever carried beyond the experimental stage. Whilst these investigations were being slowly proceeded with, the general question of the utility of ballooning on active service became more and more discussed, and its value realized especially for hilly and wooded country. Once this preliminary fact was established, it became evident that the equipment and the men to use it would have to be provided during peace-time, so that the latter might be thoroughly drilled and practised and the necessary stores selected of the best possible pattern.

The question was still in this unsettled state when Captain Templer, who had for years been a skilled aëronaut, proposed to the War Department to organize an equipment such as would be required in the field. He was granted a sum of £150 for experiments to carry out his ideas in the Royal Arsenal, and with that small assistance produced such results that it was resolved to create a proper staff of balloonists in the Corps of Royal Engineers, and to provide them with all the necessary plant.

We now find the ballooning establishment one of the most interesting and certainly not the least important of the various branches of education at the School of Engineering. Here the balloons are manufactured, the gas generated and stored, and ascents constantly practised under every sort of varying condition. The main thing that has had to be contended with is the extreme volatility of the gas and the consequent difficulty in its storage and transport. The ordinary silken material of which balloons are made was not sufficiently impervious to prevent its escape. A special material as well as a special system of construction for the balloon have been devised to obviate this evil. Then, again, it had been decided to make the gas portable by forcing it into steel cylinders under high pressure, but the difficulty arose that it was found to ooze through the valve with which the cylinder was closed. These and many other obstacles have been met and gradually overcome.

The establishment, as it now appears at Brompton, consists of the gas-producing apparatus with its gasometer, the pumping establishment for charging the cylinders, the manufactory for the making and repair of the balloons, and lastly, the various store-houses necessary to shelter the *matériel*.

The cylinders which contain the compressed gas are carried on wagons to the number of forty-four on each, piled over one another.

The balloon wagon has a drum on which is coiled the wire rope by which it is suspended in a captive state. In this rope is a telephone wire, so that the observer in the car can keep up a con-

versation with the party below—the transmitter being in the balloon car and the receiver beneath. In some cases the wagon is dispensed with, and the balloon fastened to a horse by means of a belly-band. In this way it can be conducted over ground where wagons could not travel.

Amongst other modern developments of ballooning must be mentioned the system of automatic photography, which, by means of a most ingenious apparatus, can be carried on from a small balloon without the aid of an aëronaut. This consists of a camera, on the top of which six plates rest one over the other with their prepared surfaces downwards. In the bottom of the camera, directly below the plates, is the closed eye-piece controlled by clockwork. When the balloon has reached the spot from which it is proposed to take a series of views, the machinery is set going. In the course of a few moments the eye-piece opens for the exposure, which is instantaneous, and at once closes again. The clockwork then proceeds to move the plate, which has been acted on from its position, and carries it to the side of the camera, leaving the next plate exposed. The second in its turn is exposed and removed, and so on till all six have received their impressions. The balloon is then hauled down, and the development of the plates proceeded with.

The ground from which ascents are now made is at Lidsey Farm, some six miles from the School. The course is a voluntary one, but there is no lack of students to take up so interesting a subject.

Ballooning operations have been carried on in active service, both in the Soudan and Bechuanaland.

In the Eastern Soudan use was made of the balloon on several occasions. On March 25th it accompanied the convoy proceeding to McNeill's zeriba at El Tofrek, three days after the disaster at that spot. The balloon was filled during the previous night, so as to be ready to join the convoy square at daybreak. Lieutenant Mackenzie ascended with instruments, &c., complete, and was kept by Major Templer at heights varying from 200 to 400 feet, according to his requirements. He remained in the car for seven hours. It is interesting to record the various messages which passed on the occasion. 1. No enemy in sight for three miles round. 2. There is a column of our troops three miles north, marching on Hasheen. 3. Camels appear in twos and threes about three miles off to north-west, in line with highest peak of range to left of Hasheen. Our own troops moving from zeriba towards us in square. 4. Small bodies of enemy to our left front 800 yards off. 5. (In answer to question: What strength?) About forty men and thirty men. 6. Dust rising towards Tamai three miles off, also on

Trinkitat road same distance. 7. Few of the enemy to left front 800 yards off, rather more to our left than previous body. Men getting out from bushes and running away towards Tamai. 8. Four men in open space, 800 yards away, apparently watching balloon.

Major Templer in his report says:—

"The balloon was in the air for nine hours, and was actually inflated for twenty hours. The aëronaut could see small bodies of the enemy at five miles' distance. Lieut. Mackenzie saw our square march out of the zereba at a distance of five miles. There were 350 camels and a large train of carts and wagons inside the square, but the square was not delayed by the balloon movements, and the only time it was pulled down was to relieve Lieut. Mackenzie" (by Sapper Wright).

The balloon again marched to McNeill's zeriba on April 2nd. It was inflated during a halt from the balloon wagon. On this occasion it did not do much work, as it received some damage owing to a sudden gust of wind. On April 24th it again ascended, this time to a far greater height. Two Arabs made successive ascents. In the case of the second, Ali Kerar was raised to a height of 2,500 feet. He reported from his post of observation that he could see they were firing big guns at Suakin. He had no telescope, and was trusting entirely to his naked eye, the distance being twenty-eight miles. Colonel Trefusis doubting this information, Major Templer verified it by means of the heliograph, the reply being that they had fired a *feu de joie*, in which the guns took part, in honour of the Khedive's birthday.

The Balloon Corps in the Bechuanaland expedition under Major-General Warren was in charge of Major Elsdale, R.E. There were three balloons, with complete equipment. It was found that, owing to the high level of the ground from which observations were to be made, the lifting power was much diminished, and it became necessary to select as observers men whose weight was not too great. Mackenzie, in his "Austral Africa," gives the following account of one of these ascents:—

"The first ascent" (at Mafeking) "was successfully made by Major Elsdale, the balloon being tethered or held by men. Sir Charles Warren then ascended and remained some time aloft, keeping up flag communication with those below. The balloon proceeded some distance eastward. A fine view of the country below was obtained through the clear South African atmosphere, and the Molopo district abounds in open prairie. Several officers ascended, and interesting experiments were made . . . . The chief, Moutsiou, leaning on his staff, stood apart from his people, his eye following the balloon, but himself wrapped in thought. Turning to me, he said with great animation, 'If the first white men who came into the country had brought a thing like that,

and having gone up in it before our eyes, had then come down and demanded that we should worship and serve them, we should have done it. The English have indeed great power.'"—(Mackenzie's "Austral Africa," vol. ii. p. 299.)

The subject of Ballooning cannot be concluded without some reference to Major-General F. Brine, R.E., who has attracted considerable public attention by his experiments in crossing the Channel, and generally by his aëronautical operations with his balloon, "The Colonel." This work has been carried on quite independently of that at Chatham, and has had no connection with the question of adapting ballooning to war purposes.

So extensive a range of study naturally requires a large staff, the more so as the work of a Depôt is combined with that of the School, and there are usually not less than from sixty to eighty officers and from 1,000 to 1,200 men at the station. At the head of the School is the Commandant, with a Brigade-Major as his Staff Officer. Next in rank is the Assistant-Commandant, who has special command of the officers and men as regards their military training, discipline, drill, &c. They are organized under three divisions—Training, Service, and Submarine Mining Battalions. Each branch of study is under an Instructor and Assistant-Instructor, the three subjects of Chemistry, Photography, and Lithography being treated in this respect as one.

The succession of Directors and Commandants from the first establishment of the School to the present time has been as under:—

Directors of the Royal Engineer Establishment.

Major Charles Pasley, April 23rd, 1812.
Lieutenant-Colonel Sir Frederic Smith, January 1st, 1842.
Lieutenant-Colonel Harry Jones, May 1st, 1851.
Lieutenant-Colonel Henry Sandham, March 1st, 1855.
Colonel Sir Henry Harness, July 16th, 1860.
Colonel John L. Simmons, September 1st, 1865.
Colonel Thomas Gallwey, October 1st, 1868.

The title was changed into that of Commandant of the School of Military Engineering in 1869.

Commandants of the School of Military Engineering.

Colonel Thomas Gallwey, August 17th, 1869.
Colonel Sir John Stokes, November 1st, 1875.
Colonel Sir Andrew Clarke, April 1st, 1881.
Colonel Edward Gordon, August 15th, 1882.
Colonel John Edwards, November 1st, 1885.
Colonel R. Dawson-Scott, May 1st, 1888.

In order to provide class-rooms for the various schools, the Royal Engineer Institute was built in the year 1872, from the designs of Lieutenant Ommanney, R.E., the Institute itself occupying a portion of the building. This is under the control and management of a Committee of Engineer Officers, of whom eight are *ex officio* and sixteen elected. The Secretary is elected by the Committee from a list of names previously submitted to and approved by the Commander-in-Chief. The successful candidate must obtain an actual majority of the votes of the Committee, *i.e.*, at least thirteen out of the twenty-four, to secure election.

The first Secretary elected in this manner was Major W. H. Collins, appointed in August, 1875. He was succeeded by Captain R. H. Vetch in 1877, who held the post until 1884, when his place was taken by the present occupant, Major F. J. Day.

From the time that the Brompton Barracks became the seat of the School of Military Engineering, it was evident that if it fulfilled the purpose for which it had been formed, it must, in the course of time, become recognized as the Head-quarters of the Corps. It was, however, only by degrees that this was accomplished. In the year 1850, as we have seen, the Depôt of the Royal Sappers and Miners was moved from Woolwich to Chatham, and their military as well as special training was carried on at the latter place. The Depôt brought with it the Brass Band, which was the only one at that time existing in the Corps. This could in no way be considered a Regimental Band, having been formed purely for Depôt purposes. Serjeant-Major Youle was the Bandmaster. In 1856 a Regimental Brass and Reed Band was established, and Mr. W. G. Collins appointed as its leader. He was succeeded by Mr. Newstead, who in his turn was followed in 1871 by the present Bandmaster, Mr. J. R. Sawerthal, a native of Bohemia, who had held many high musical appointments abroad before his arrival in England. Under Mr. Sawerthal's government a String Band has been added, and so successful have been his efforts that this Band is constantly engaged to accompany in Oratorios, and also to give renderings of the higher compositions of the great masters. It has appeared at the various exhibitions held in London, Edinburgh, Manchester, Liverpool, Folkestone, and Glasgow. During the Jubilee year it played at the great receptions given by the Prime Minister and Marchioness of Salisbury at the Foreign Office, and also at Hatfield on the Jubilee day. By command of Her Majesty, it played at the State dinner at Buckingham Palace. In proof of its excellence, the following two quotations from Glasgow papers show the impression made in that city by its performances:—

" . . . . I do not think that I have ever heard a better rendering of the 'March of the Mountain Gnomes.' It is a beautiful piece of music, and has always been popular at our Choral Union concerts during the winter months. There is a fine swinging tramp about the principal passage in it which the Engineers caught to a nicety, and in the softer passages there was displayed a delicacy of treatment, which a military band is rather apt to fail in. The gradual dying away of the sound as in the distance was excellent."—("Glasgow Evening News.")

"The music in the Grand Hall last evening was altogether of a high class. The Engineer's string band of course carried off first honours, and got simply a furious acclamation for their rendering of Beethoven's C minor symphony. Too much praise could not be given to the Band, for the test of their powers was a severe one, and they came out of the ordeal well."—("Glasgow Evening Times.")

The Mess Establishment began on a very small scale, and has grown in importance with the increase in number of the officers who have annually passed through the School. It was, however, for many years after its first formation only an ordinary mess, larger and more numerous than any of the similarly constituted establishments at our great military stations, but still not occupying in any way a superior position. Of late years this has been changed. The Government has erected a handsome and commodious range of buildings for its accommodation, and the Corps has ratified its position as a Head-quarter Mess, by calling upon every officer, no matter where quartered, to contribute towards its maintenance. A collection of portraits of distinguished Engineers of the past and present time adorns the principal rooms. This is being constantly augmented, so as even now to form a very important gallery, and it is easy to see that in course of time its value will become extremely great. A system has also of late years been adopted which will eventually produce a magnificent, and at the same time highly interesting and artistic display of plate. At the end of every campaign, the officers who have taken part in it present to the Corps Mess a trophy of their prowess. This was initiated at the close of the Crimean war, and has ever since been continued. The Mess now possesses cups or groups commemorating the following campaigns in which the Royal Engineers have borne a distinguished part: The Crimea, the Indian Mutiny, China, Abyssinia, Ashanti, Afghanistan, Zulu, Egypt 1882, and Egypt 1884-5-6. These are in addition to the presents offered by individuals, foremost among which stands the Cup given by His Royal Highness Prince Arthur, who began his military career in the Royal Engineers.

Commemorative of this fact, the Corps possesses a photograph which is highly prized. It represents the oldest and the youngest

officer in the British army, both being Royal Engineers. These are Field Marshal Sir J. Burgoyne and H.R.H. Prince Arthur.

A few words must also be said in reference to the reading and recreation-rooms, and the regimental Canteen for the use of the Non-commissioned Officers and Sappers at the School. It would be difficult to find an establishment so perfect and complete in every detail. The result is that the men have little temptation to seek relaxation and amusement elsewhere, and the crime sheet of the Engineers at the Brompton Barracks is curiously small.

The extent of the Canteen may be judged by the following figures for the year 1887. The takings at the grocery bar were £13,011, and at the beer bar £7,760. The consumption of aërated water is enormous, and is all manufactured on the premises. It is in contemplation to provide a special steam engine for its production, and when that is done, it is intended to utilize it for driving an apparatus for brushing hair by machinery in the barber's shop which is attached to the establishment. The canteen smoking concerts, which are really singing and dancing competitions for prizes, are very successful, and afford evening amusement to a large number of men during the winter months, amounting often to from 600 to 700, and the concerts last for upwards of two hours.

This sketch of the School of Military Engineering may fitly be closed by a brief reference to the memorials with which the officers of the Corps have from time to time honoured such of their comrades as have fallen in war, either from wounds or sickness. Most regiments of Cavalry or Infantry are connected by name with special parts of the country. They have, therefore, naturally selected as the sites of their regimental memorials either a parish church, or where feasible, the Cathedral of the county, the name of which they bear. The Corps of Royal Engineers, however, has no county in particular, nor has it colours or badges for particular battles or campaigns. It claims the whole empire as its territorial mother, its proud motto is "*Ubique*." But although it has none of those ties with any particular county, which are now possessed by nearly every regiment of the Line, yet for many years it has been so closely linked with Chatham, that it was but natural a feeling should spring up to concentrate its memorials at that station. Rochester, which is practically a continuation of the same town, possesses a Cathedral peculiarly associated with the history of the ancestors of the Royal Engineers. Its designer and builder, Bishop Gundulph, was a military Engineer as well as a cleric, and is claimed by the Corps as one of its forefathers. In the structure that he reared, it seems most appropriate that their memorials should be concentrated, and the Dean and

Chapter have willingly permitted their noble pile to be made the Walhalla of the Royal Engineers.

The great west window has been taken as the most important feature, and is treated as follows:—The lower portion contains two rows each of eight lights. In the upper eight are single figures representing—1. Abraham; 2. Moses; 3. Joshua; 4. Gideon; 5. Jephtha; 6. Samson; 7. David; 8. Nehemiah. In the lower eight light scenes are represented, each being connected with the figure in the light above, viz.—1. Melchisedec blessing Abraham; 2. The overthrow of Pharaoh in the Red Sea; 3. Joshua commanding the sun to stand still; 4. Gideon overcoming the Midianites; 5. Jephtha returning victorious; 6. Samson carrying off the gates of Gaza; 7. David slaying the lion; 8. Nehemiah building the walls of Jerusalem. In the arch of the window are twelve small lights, in which are represented Caleb, Othniel, Deborah Barak, Samuel, Jonathan, Benaiah, Jehosophat, Hezekiah, Josiah, Matathias, and Judas Maccabæus. Over these are the following ten Military Saints: St. Maurice, St. David, St. Edmund, St. Alban, St. George, St. Andrew, St. Louis, St. Martin, St. Patrick, and St. Gereon. The inscription runs as follows:—"To the Glory of God, and in memory of the Officers, N.C. Officers and Men of the Royal Engineers, who died for Queen and Country, in South Africa, during the Kaffir, Zulu, and Transvaal Campaigns of 1878-81. In Afghanistan during the Campaigns of 1878-9, and 1879-80; and in the Waziri Expedition of 1881, the above Window is dedicated to the Corps of Royal Engineers."

In addition to the great west window, the two smaller windows on its right and left are dedicated to two officers whom the Corps is especially desirous to honour. One of these is Colonel Anthony Durnford, who fell bravely fighting to the last with a handful of faithful followers, endeavouring to cover the retreat on the fatal day of Isandlwana in Zululand; the other, Lieutenant T. R. Henn, who in the same manner fought to the bitter end, and died with his Native Sappers and a few men of the 66th Regiment, being the last left on the field at the disastrous battle of Maiwand in Afghanistan.

The Durnford window represents three events in the life of Judas Maccabæus. (1) That in which Judas defeats Apollonius and takes his sword. (2) Judas, when opposed with his small force of 800 men to the army of Bacchides and Alcimus 22,000 strong, saying, "God forbid that I should do this thing and flee away from them; if our time be come, let us die manfully for our brethren, and let us not stain our honour." (3) The death of Judas—"Judas also was killed and the remnant fled," 1 Maccabees

ix. 18. Beneath is the inscription, "To the glory of God, and in memory of Colonel A. W. Durnford, Royal Engineers, who was killed in action at Isandlwana, South Africa, this window is dedicated by the Corps of Royal Engineers. Faithful unto death."

The Henn window represents three scenes from the life of Jonathan. (1) Jonathan and his armour bearer smiting the garrison of the Philistines. (2) Jonathan and David making a covenant. (3) The death of Jonathan. A similar inscription to that for the Durnford window, with due alteration for name of the battle where he was killed, is placed below.

The other windows are the raising of Lazarus, in memory of General J. A. Ballard, C.B., R.E.

The Centurion, "I say unto you, I have not found so great faith, no not in Israel," in memory of Colonel Robert Home, C.B., R.E.

The Crucifixion, with the Centurion at the foot of the Cross, saying, "Truly this Man was the Son of God," in memory of Captain R. N. Buckle, R.E., killed at Amoaful in the Ashanti campaign.

The Centurion Cornelius with the angel of God, "What is it, Lord?" in memory of Captain W. Innes, R.E., who was killed in the attack of a stockade at Perak.

Moses during the battle with the Amalekites, his hands being upheld by Aaron and Hur, in memory of Major Samuel Anderson, C.M.G., R.E.

Joshua and the Angel before Jericho, in memory of Captain W. J. Gill, R.E.

David and Goliath, in memory of Captain James Dundas, V.C., R.E.

The Ascension, in memory of Lieut. F. N. Hassard, R.E. There is also a Brass, set in a marble tablet, in memory of Major M. Lambert, R.E.

Since the above was written a further addition of windows has been made as memorials to the Engineers who fell in the Peninsular, Egypt, and Soudan campaigns. These occupy the south end of the south-west transept. Above are five graduated lights representing the patron saints of the countries whose armies fought as allies against the French in the Peninsula and at Waterloo, viz., St. George for England, Prussia, and Portugal, St. Nicholas for Russia, St. James the Great for Spain, St. Maurice for Austria, and St. Adrian for Prussia and the Low Countries. An inscription runs along the bottom, "In memory of the Officers of Royal Engineers who served in the Peninsula and Waterloo. These windows are inserted, 1888, by the Corps of Royal Engineers."

Below these are three larger windows. The centre contains figures of St. Alban and St. Martin, the left St. Florian and St. Gereon, the right St. Denis and St. Longinus. Below these is an inscription, "This tier of windows was filled with stained glass, 1888, by the Corps of Royal Engineers, to the glory of God, and in memory of Major-General Charles George Gordon, C.B., R.E., who was killed at Khartoum 26th January, 1885, also of the Officers, Non-commissioned Officers and men of the Royal Engineers and of the Madras (Queen's Own) Sappers and Miners who fell in Egypt and the Soudan, 1882 to 1885."

CHAPTER V.

Royal Engineer Committee.

Warrant establishing Committee at the Tower in 1782—Colonel Debbieg and the Duke of Richmond—Dissolution of Committee—New Committee formed in 1857—Abolition in 1859—Appointment of Captain Duff for preparation of a Reserve of Stores—Revival of Engineer Committee in 1862—Remodelled in 1866—Appointment of Major Home as paid Secretary—Present constitution of Committee—List of Secretaries.

The parentage of the present Royal Engineer Committee is to be traced to the Royal Warrant of 1782, which established a Committee at the Tower. The portion which bears on this point runs as follows:—

"And whereas you have represented to Us that it would be for the Benefit of Our Service if a Committee of Engineers were established, to which all Plans and Estimates for the Construction of New Works or Buildings, or for the Repairs or Alterations of old ones were referred and on which the said Committee should report to the Master General of Our Ordnance previous to their being carried into Execution, We do hereby direct you to appoint a Committee of Five Engineers, for the Purpose, of which the Chief Engineer shall be President, and two at least of the other four shall be Field Officers. And We do hereby direct that the said Committee shall meet at the Ordnance Office in the Tower two Days in every Week, or as often as the Master General may think necessary, to receive, examine, and report upon the several Plans and Estimates that shall be referred to them, and that the Clerk to the Chief Engineer and the Draftsman appointed to attend him shall act as Clerks to the said Committee, and shall keep Copies of all Plans and Estimates referred to the said Committee and of their proceedings thereupon. And We do direct that the four Engineers who shall be appointed of this Committee to assist the Engineer in Chief shall be considered as employed and shall receive an Allowance of Extra Pay like the Engineers employed in Great Britain, that is to say, equal to one half of the Ordinary Pay which, according to their Rank in the Corps, they will by this Establishment be intitled to receive."

In accordance with the terms of this Warrant, it was intended that the Committee should consist of the following officers:—

Major-General James Bramham, President.
Colonel John Brewse.
Colonel Hugh Debbieg.
Lieutenant-Colonel William Spry.
Captain Abraham D'Aubant.

The Duke of Richmond wrote to the several officers announcing their selection, but Colonel Hugh Debbieg made objections to taking office. The Duke then wrote him a second letter very temperately worded, pointing out the small amount of work such duties involved. To this Debbieg returned the following reply:—

"Chatham, 25th July, 1784.

"My Lord Duke,

"In answer to the honour of your Grace's letter of the 21st inst., wherein you are pleased to say you wish to know 'whether the degree of attendance which will be requisite on my being appointed one of the Committee at the Tower makes any alteration in my inclination to be of that body in preference to remaining here, the extra pay being the same,' I must beg leave to remind you that the reason I gave your Grace in my letter was that I might attend to my private concerns, though as I look upon the present reform to be in fact a sort of superannuation, it is a matter of indifference to me whether I am employed or not, as I humbly conceive the new regulations to be particularly pointed to distress the higher part of the corps, making scarcely any difference between the services of thirty-nine years and eighteen. With intentions as pure and a zeal for the service as great as others of whatever denomination, I feel myself singled out for slights and oppressions. How long I may continue to suffer under them I will not say at present, but sure I am a little time will discover them.

"I have the honour to be with all possible respect,
"My Lord Duke,
"Your Grace's most obedient and most humble servant,
"Hugh Debbieg."

A few days afterwards Debbieg addressed a letter to the Chief Engineer, Major-General Bramham, in which he indulged in still further licence of language; the result was that he was tried by court-martial on charges based on these two letters. He was found guilty, and sentenced to be reprimanded in open court, and to make submission to the Duke of Richmond in terms which were specified.

There is no record of who was selected to take his place. He appears on the list in that year as Unemployed.

The Royal Warrant of April 21st, 1802, suppressed the Committee at the Tower. The title of the Chief Engineer had by that Warrant been changed into "Inspector-General of Fortifications," his allowances largely increased, and his status and power over all

Engineer matters much developed. The Committee had not been found to work well, and their duties were transferred to the new Inspector-General, Lieutenant-General Morse. It was laid down that in future all plans and estimates for construction, repair of work, &c., were to be referred to him, or, when deemed expedient, to a temporary body of Engineers to be specially convened at the Tower or elsewhere as the Master-General and Board might think advisable. The Committee at the time of dissolution consisted of the Chief Engineer, Sir William Green, Major-General W. Spry, Colonel A. D'Aubant, Lieutenant-Colonel Hartcup, and Lieutenant-Colonel H. Rudyerd.

The Master-General and Board seem to have exercised their right very soon, for in the month of September, 1803, we find that the new Inspector-General of Fortifications, General Robert Morse, was President, and Lieutenant-General A. Mercer, Colonel A. D'Aubant, Colonel W. Twiss, and Major Sir C. Holloway, were members of one of these temporary conclaves sitting at the Tower. There is no record of how long they continued to exercise their functions, nor what were the questions submitted for their deliberations.

There is no trace of any further convocations of the kind, and the Inspector-General of Fortifications seems to have had supreme control over all questions relating to plans, estimates, and projects generally, until the year 1857, when a new Committee was appointed by Lord Panmure.

In the later years of the period which had intervened there had been an Artillery Committee, to which all proposals for the improvement of the *matériel* of the army were referred. This had not been found to work well, as the officers so nominated were naturally insufficiently acquainted with the technical details of many Engineer matters submitted for their report, and were consequently unable to deal satisfactorily therewith. It was therefore thought advisable that all questions belonging exclusively or even principally to that branch of the Service should be referred to a body composed of Engineer Officers, which should sit at Chatham, the School of the army in all Engineering matters.

This system lasted two years, and in 1859 was abandoned on the formation of the revised Ordnance Select Committee. The next stage in the matter arose from the development of the Engineer Troop into the A or Pontoon, and B or Equipment Troops, in 1863. Captain Duff, who was placed in command, was of course much engaged with the Store Department in the preparation of the necessary equipment, and in the selection of the most suitable patterns.

He was also, in consequence, thrown into personal intercourse

with Lord de Grey, through whose action the new establishment had been authorized. It was at one of these meetings that he drew attention to the fact that whilst the work then going on would provide a well-planned supply of stores for field operations, the siege equipment of the Corps had not as yet been dealt with, and he submitted a paper on the subject. The result of this action was that on July 9th, 1863, Lord de Grey (who had by that time succeeded Sir George Lewis as Secretary of State for War) addressed the following questions to the Director of Stores :—

1st. Whether any of the stores in the proposed reserve of Engineer Field Equipment then being formed would be available for an Engineer Siege Equipment proportionate to the existing reserve Artillery Siege Train of 105 guns?

2nd. Whether an electric telegraph, similar to that sent out to the Crimea, but arranged to move with an army in the field, should form part of the reserve?

3rd. Whether any scientific instruments, similar to those in use at the School of Military Engineering, such as voltaic batteries for firing mines, surveying instruments, &c., should form part of the reserve?

On these questions being referred to Colonel Chapman, Deputy Adjutant-General Royal Engineers, he reported that none of the articles in the reserve of Field Equipment would be available for Siege equipment; that patterns of the siege and other stores mentioned should be decided on, and a reserve of them formed; that no advantage had yet been taken of the experience gained in the Crimea in these matters; that he had on a previous occasion proposed that an officer of Engineers should be appointed to act with the Store Department in the matter, but that his proposal had not met with approval at the Horse Guards, and he now suggested that the Secretary of State should himself apply for an officer.

To this Sir John Burgoyne added a minute :—

"We have no recognized system of Engineer stores for the field, nor any depôts of them for emergent services which might at any time arise."

He added that it was most important that this should be rectified, and he agreed in the suggestion of the Deputy Adjutant-General that the Secretary of State should apply for an Engineer officer to work out the question with the Store Department.

In returning his replies to the questions of the Secretary of State for War, Admiral Caffin accompanied them with these papers, and further suggested that Captain Duff, who had been associated with him in the preparation of the Pontoon Equipment and Field stores,

should be the officer applied for. Duff was at this time in command of the newly organized A and B Troops, which were only just emerging from their state of infancy. It was not, therefore, thought advisable entirely to sever him from the work he was performing so well, and the following compromise was the result :—

"Horse Guards, 22nd Sept., 1863.

"Sir,

"I am directed to acquaint you for the information of the Lt.-Genl. Comg. the Troops at Aldershot that H.R.H. the Field Marshal Comg. in Chief, at the request of the Secretary of State for War, has been pleased to approve of Capt. Duff, R.E., being temporarily employed in conjunction with the Director of Stores at the War Office in the preparation of Lists of Engineer Stores for an Army in the Field. . . . . Capt. Duff is to be posted to the Depôt of the Royal Engineer Train pending his employment on the special duty referred to. He will thus be relieved from the most pressing duties of his present position, but still be sufficiently identified with the Train generally to carry out the arrangements and organization he has commenced under the new system.

Sd. "H. Fane Keane.
"Lt. Col., A. A. Genl., R.E."

In obedience to the instructions contained in this order, Captain Duff entered upon his new duties in September, 1863. Meanwhile, the Engineer Committee had been revived. In 1862 it was found necessary that some body more conveniently placed than the Ordnance Select Committee should be formed for the purpose of experimenting upon pontoons, and Chatham was chosen as the most suitable spot for the work. It being, moreover, of a purely Engineer character, it was but proper that the majority of members of the new Committee should belong to that branch of the service. The men selected were the Director of the Royal Engineer Establishment, with the principal Instructors under him, as well as the Commandant at Shoeburyness and the Superintendent of the Royal Carriage Department at Woolwich. Whilst Duff was working at Woolwich in conjunction with Admiral Caffin, the Chief Storekeeper, in preparing the necessary lists, many questions were naturally referred to the Committee and experiments carried on by them. For this reason he was temporarily attached thereto, in order to render the necessary assistance.

In 1865 a Committee had been appointed to inquire into the organization of the Royal Engineer Establishment at Chatham, of which Lieutenant-General Sir R. Airey, the Quartermaster-General, was President. They, amongst other matters, recorded their opinion that the Royal Engineer Committee should be reconstituted, so as to consist only of Engineer officers.

This suggestion was approved by the Secretary of State for War, and the new body was ordered to consist of Colonels Simmons and Collinson, Captain Parsons, and Lieutenant-Colonel Lennox. Their functions were laid down to be—

"to consider questions of Military Engineering, on which it is desirable that the S. of State for War should be specially informed; such as inventions and improvements in articles of Engineer Equipment, &c., and all the reports of the Engineer Committee must have reference to the Equipment and efficiency of Engineers in the field."

This occurred in 1866.

Captain Duff continued his services in connection with the preparation of the necessary supply of Engineer Stores until 1867, when the matter being nearly completed, he handed over the further prosecution of the question to the Committee, and served no longer on it.

In 1869 it was pointed out by H.R.H. the Field-Marshal Commanding-in-Chief in a minute upon a recommendation from the Commandant of the S.M.E. for a paid Secretary, that—

"Hitherto the R.E. Committee has consisted solely of officers of Engineers belonging to the Establishment at Chatham, who have had other duties which occupy their time."

The Director of the S.M.E. had also written a minute to the effect that—

"the time of these officers being already fully occupied, they find it inconvenient to give the leisure necessary for the consideration of the several inventions submitted. Consequently the investigations of the Committee are often hurried and imperfect."

His Royal Highness gave as his reasons for recommending a reorganization of the Committee and the appointment of a paid Secretary, that the Royal Engineer element might be officially represented at experiments which were being carried on at Shoeburyness, and that full and accurate information should be collected as to experiments or other matters which might affect the proceedings of the Royal Engineer Committee. This was embodied in a report of March 30th, 1869, by Colonel Jervois, who concluded by saying that—

"the abolition of the Ordnance Select Committee renders it necessary to give to the R.E. Committee an organization which will enable the Secretary of State for War to get reliable information on other subjects than questions of improvements in articles of Engineer Equipment,"

and he urged that it should be reconstituted to consider inventions.

Nothing at the time came of these recommendations, but in

the following year the Commandant of the School of Military Engineering once more moved in the matter, with the result that a sum of £300 was voted for the use of the Committee, of which £200 was to be the allowance of the Secretary, and the other £100 divided amongst inferior officials. Major Home was the officer selected to fill the post of Secretary under these new conditions. Attempts were afterwards more than once made to alter the constitution of the Committee, but without success. It was at one time proposed that two additional members should be added of the rank of Lieutenant-Colonel, each of whom was to receive a salary of £800 per annum, one paid by the War Department, and the other by the Indian Government. This, however, fell through. At another time Mr. Cardwell decided that the duties performed by the Royal Engineer Committee should be delegated to temporary Committees, to be formed whenever special questions arose, but this also never took effect. The Committee has remained constituted very much on its original lines, and consists of the Commandant S.M.E. as President, the Chief Instructors in Building Construction, Field Fortification, Surveying, Submarine Mining, and Telegraphy, with the Assistant Adjutant-General, R.E., an Assistant Director of Works, R.E., the Inspector of Submarine Mining Defences, and the War Office Chemist, with whom are associated five other members of the Corps. The following officers have in succession acted as Secretaries of the Committee, viz:—

Major R. Harrison, 1866.
Captain F. A. Marindin, 1869.
Captain R. Home, 1870, first paid Secretary.
Captain V. G. Clayton, 1871.
Captain M. T. Sale, 1876.
Major G. E. Grover, 1880.
Captain G. Barker, 1881.
Captain G. W. Addison, 1882.
Lieutenant L. B. Friend, 1884.

It may be added that, in 1873, an Assistant Secretary was appointed with an allowance of £150 per annum, for the executive duties of making preliminary inquiries and reports on the various subjects brought forward. This officer was to be stationed in London, so as to carry on his duties at the War Office. The post was abolished in 1876.

PART III.

DEPARTMENTAL AND CIVIL WORK.

CHAPTER I.

The National Defences.

Board on National Defences in 1785—Their Report—Scheme brought before Parliament and Rejected—Glenie and the Duke of Richmond—The Long Peace—Warning Note Sounded by Sir J. Burgoyne—Lord Palmerston's Cabinet Paper—The Duke of Wellington's Letter—Cobden and the Peace Party—War with Russia—Royal Commission on Defences in 1859—Their Report and Estimate—Adopted in a Reduced Form—List of Works as carried out—Their Designers—Inglis and the Ironwork of the Forts—Fitment Committee—Coaling Stations and Mercantile Ports—Militia and Volunteer Submarine Miners—Engineer Coast Battalion—Sir Lintorn Simmons's Defence of the Works.

The question of creating an extensive system of National Defences in England in modern times was first brought to public notice and discussion by the Duke of Richmond, as Master-General of the Ordnance, in 1784. In that year it was proposed to take a vote of £50,000 on account of fortifications at the naval ports; but the objection being raised that no information on the subject had been laid before Parliament, the vote was withdrawn. In 1785 the King named a Board of military and naval officers to investigate the whole question, and the Duke of Richmond was made President. The dockyards of Portsmouth and Plymouth were the chief points to be considered. The Board consisted of eleven General Officers, one Admiral, and two Captains of the Navy. Of the military officers three were Engineers, viz., Major-Generals Bramham, Green, and Roy. On June 24th, 1785, the Board submitted an elaborate report. From this it may prove interesting to quote some extracts:—

"It is perfectly right, necessary, and wise effectually to provide in time of peace for the security of your Majesty's dockyards at Portsmouth and Plymouth by fortifications capable of resisting such an attack as an enemy may be able to make upon them during the absence of the fleet,

or whilst from other causes the fleet may be prevented from affording its protection to the dockyards. . . . . Your Majesty's Land Officers at Portsmouth and Plymouth are unanimously of opinion that such is the situation of the present works, that no finishing, repairs, or improvements without additional works, can under the circumstances of the data, afford that degree of security to the dockyards as may enable your Majesty to employ your whole fleet, if necessary, on foreign service. Your Majesty's Land Officers both at Portsmouth and Plymouth, are unanimously of opinion that the system of detached works, as proposed, has in the extensive situations of Portsmouth and Plymouth this advantage, that the security to be derived therefrom will not be wholly delayed till the whole of the proposed plan is executed; but an additional degree of strength will be acquired as the detached works are progressively finished."

As regards the proposed works both at Portsmouth and Plymouth, the Board considered "that the sites are well chosen for detached works," and also that the proposed forts "are well adapted to those situations."

They then add as regards Portsmouth that—

"The proposed finishing works already begun, the improvement of the old ones, and the plan for rebuilding Southsea Castle will, together with the works proposed, give a reasonable degree of security for your Majesty's dockyards. . . . . Whereas the present works, even when repaired, finished, and improved, would require a large force for their defence, with which they would still be ineffectual for the purpose of securing this dockyard."

As regards Plymouth they make a similar report, and then add:—

"The unanimous opinion of your Majesty's Sea Officers is, that a certain number of gunboats at Portsmouth and Plymouth will form a great arm of defence against an invading enemy."

Also that a set of signals "on the projecting head-lands" should be established, "with intelligent mariners to make them." They conclude by saying that they submit this report—

"in full confidence that the providing an additional security to the dockyards at Portsmouth and Plymouth, is in no respect inconsistent with the necessary exertions for the support of the navy, which they consider the first object of attention for the safety and prosperity of the kingdom."

In consequence of this report, Mr. Pitt, on February 27th, 1786, brought forward the scheme, which was violently opposed by the Whigs, the economists, and some others, who feared lest their property, or that of their constituents, might be damaged. The result of the division was a tie, on which the Speaker gave his vote against the measure.

The Duke of Richmond, although for the time baffled by this adverse vote, was determined to persevere, and carry out piecemeal much of what was denied to him as a whole. For some years he continued to develop the fortifications of the country, and obtained votes for the purpose from Parliament, although he was often strongly opposed. He had a warm supporter in the Prime Minister, and by his aid succeeded in overcoming all obstacles. In the year 1789, in a debate on March 20th, on a proposed vote for fortifications, Mr. Courtenay thus expressed himself:—

"He was acquainted with the customary practice of the Board of Ordnance, at least some years since, that it had been usual for the Board to have a plan and estimate of every new work submitted to them. If, in the present instance, the same mode were adopted, it would be an easy matter to submit the estimate at least to Parliament. If the noble Duke at the head of the Board of Ordnance acted without estimates, undoubtedly the House could not expect to have an estimate laid on the table, but must proceed, if they proceeded at all, to follow the noble Duke, and take their chance of the ultimate amount. He thought the Chancellor of the Exchequer supposed the probable sum to be from £180,000 to £200,000. He reminded the House that two or three years ago the noble Duke applied for leave to fortify Plymouth and Portsmouth, and much the same arguments in support of the project were urged then as had been that day advanced. The first sum asked was a specific one: the House wished to have it more critically ascertained, and remanded the consideration to the Board of Ordnance. The second sum asked was much larger; the House was not yet satisfied, but desired that the matter might be referred to a Board of General Officers. In their report a still more considerable sum was stated to be necessary, a clear proof how little mere assertion on the part of the Ordnance Board was to be relied on. If the plan were really the plan of the Engineers, he declared he should have the better opinion of it; but, unfortunately, all the plans of fortifications lately submitted to Parliament were notoriously the plans of the noble Duke himself, and the Engineers were merely left to execute them. As a proof of that he would mention a fact. He remembered that an engineer was sent over to Africa to view a certain situation and examine the propriety of erecting a fort there. The engineer went over, and on his return the noble Duke was at the head of the Ordnance, and he altered the engineer's plan and adopted a plan of his own. Colonel Bramham was then at the Ordnance Board, and incurred the Duke's displeasure because he pointed out the errors of his plans."—("Ann. Biog. and Obit.," 1818, pp. 339, 340.)

There was much truth in Mr. Courtenay's accusations. The Duke of Richmond was an extremely able man, with a great taste for fortification; but he was given to forcing his own plans upon the Engineers and resenting all criticism. Courtenay was private secretary to Lord Townshend, the rival of the Duke, and was aware

of his failings. The then recent collision between the Duke and the young Engineer Glenie, where the subaltern had fearlessly exposed the many errors and fallacies of the Master-General's schemes, certainly did not redound to the great man's credit, and his vengeance, which was not satiated until he had hounded Glenie from the Corps, of which he had proved himself a very promising member, was not worthy of him. The memory of that ignoble jealousy still rankled in the minds of many, and was probably one of the principal reasons for the bitter opposition with which the Duke's views were met.

The general war which broke out shortly after, and the desperate struggle for existence in which the country was plunged, caused so large a demand on the national finances that it was impossible to continue the grand schemes propounded by the Duke of Richmond. Matters, therefore, remained in a state of abeyance, and nothing further was heard for many years of any general plan for the improvement of the National Defences.

The position which Great Britain occupied after the termination of this long war was so powerful, and, on the other hand, that of her enemy so shattered and enfeebled, that it is not surprising to find the country lured into a feeling of security, which it retained long after all grounds for its existence had vanished. Year after year passed by; the memory of the great struggle, and of all the heroic efforts made to bring it to a successful issue, grew more and more dim, and yet everyone buoyed himself up with the idea that England was invulnerable. As the demands for economy and retrenchment grew urgent under the impatience of a taxation which the country could ill afford, so did even the slender means of defence left to us diminish slowly but sensibly. War, with all its perils and horrors, seemed as though it had passed away permanently, and every shilling spent on the national armaments was grudged by men who called themselves financial reformers. In a country where power can only be held by those who are acting in accordance with the will of the nation, it was difficult, if not impossible, for Ministers, if they had any desire to hold their position, to stem the tide of the general demand for reductions.

The consequence of these combined influences was that it became evident to all who thought seriously on the subject that England was running a fearful risk of invasion in the event of war. The gradual development of marine steam power was adding greatly to the danger. The trust that had hitherto been reposed in the naval forces of the kingdom was felt to be no longer justified, and if a catastrophe was to be averted it must be by securing a second line of defence.

Foremost amongst those who took this gloomy view of our

position was that sagacious and far-seeing veteran, Sir John Burgoyne. He had not long been placed at the head of his Corps as Inspector-General of Fortifications in 1845, before one of his earliest steps was to prepare an admirable paper on the defenceless state of the country, which he entitled "Observations on the possible results of a war with France under our present system of military preparation." This paper he laid before the Master-General of the Ordnance on November 7th, 1846, and in so doing took the first step in that long line of incidents and struggles which have led by degrees to the present condition of the National Defences. In this document there is the following passage :—

"To add to this defective condition we are all but absolutely without that useful auxiliary in defensive warfare, namely fortresses. Our dock-yards alone have a semblance of being fortified, but the works are so imperfect that not one of them is pronounced in the formal reports of the Engineers to be secure against a *coup de main*."

This paper was submitted as a confidential document to the various members of the Cabinet, and led to the preparation by Lord Palmerston of a very weighty statement for discussion, which he drew up with the assistance of Sir John Burgoyne, who thus became possessed of a copy of it. This report was laid before the Cabinet by Lord Palmerston, on December 17th, 1846, little more than a month after Burgoyne had sent his original memorandum to the Master-General. It begins by showing that the French had every inducement of self-interest, as well as of hatred and revenge, to undertake an invasion. It then points out that although her normal naval power was not equal to ours, still circumstances might easily lead to her obtaining a temporary supremacy in the Channel, and that she had such a powerful army that she could promptly avail herself of such an opportunity if it occurred.

"If a war were to break out between England and France, it is not at all impossible that France, though really inferior as a naval power, might by her superior means of naval preparation bring such a fleet into the British Channel in the first fortnight or three weeks after a rupture as to be for the moment in very superior numerical force. In regard to her land forces, she has a war establishment in time of peace : she has an army of 350,000 men, from which deducting 100,000, who for the present are employed in or appropriated to her African possessions, there remain upwards of 200,000 men at home and for her colonial service, of which probably more than 100,000 would at any time be disposable at a fortnight's notice for any particular service, and specifically for an invasion of this country in the event of a war.

"The military stores of all kinds in France are ample, and they are all deposited in places of strength capable of defence. Railways are

constructing by the friendly aid of British capital, which will soon give the French great additional facilities for the transport of men and stores. It is quite plain that her great command of steamers fit for the conveyance of troops would enable France to transport at once a force of from twenty to thirty thousand men, starting either from Cherbourg or from that and other ports in the Channel, with orders to rendezvous at a given time, at a given place; that one single night would be sufficient for their passage, and that no naval precautions which our existing establishments would enable us to take, could with certainty intercept their course or prevent them from reaching our coast, and there is a vast extent of sandy beach on the south-eastern coast of England, where a landing could be most easily effected. The whole extent of that coast is bare of any efficient batteries to oppose a landing. But even if all the coast defences recommended by the Duke of Wellington were finished, armed, and manned, they would not prevent the landing of twenty or thirty thousand men."

After depicting all the evils that would arise from such an incident, the report goes on to deal with the then existing means of military defence, and proposes the organization of a militia to be called out annually for training :—

"And which should be so liable to be called out at a ten days' or a fortnight's notice, at the approach of danger. . . . 100,000 for Great Britain and 40,000 for Ireland would not be too much to deter an enemy from attempting an invasion."

Having detailed all the arrangements that would be necessary to secure such a militia, the paper proceeds to touch on the question of fortifications :—

"The expense of fortifying the dockyards will certainly be considerable. Much is doing in this respect, but much more requires to be done. Portsmouth, Plymouth, and Sheerness will soon be defended by batteries, which will secure them against any front attack from the sea by ships of war. Pembroke is as yet wholly without any defence of the kind. But when these sea defences are finished, Portsmouth, Plymouth, and Sheerness will all be assailable from the land side by a body of a few thousand men disembarked in the immediate neighbourhood, and provided with artillery for firing into the dockyards. Each of our dockyards can be fired into from points at present undefended, without its being necessary for the assailing force to take possession of any of the works now in existence or now in process of construction. . . . To place our dockyards in security against a *coup de main* by sea or by land would probably require a million, but this is a matter of indispensable necessity. . . . Woolwich, the great deposit for our military stores, is wholly open and undefended, and from its position on low ground commanded by neighbouring heights, it is incapable of being fortified. It is not fitting that our principal depôt for military stores for an army and fleet should be so placed; our stores ought to be

in some position in the interior of the country, and capable in some degree of being defended. Our southern coasts require batteries to command landing-places and to protect anchorages, such as the Downs; and some such defences are needed for the Mersey and for the Firth of Forth, not against a serious invasion but against a predatory incursion. We require harbours which, under the name of 'harbours of refuge,' should be fortified stations for ships of war employed for the defence of our commerce and of our coasts. We require some of these in the Channel Islands as well as on the coast of England. All these works are essentially necessary to enable our soldiers and our sailors effectually to defend the country against an enemy; but the cost of these various works cannot in the aggregate be estimated at less than five or six millions at least, if the projected harbour at Dover is included."

The report concludes with a proposal to raise the necessary funds by means of a loan, and is signed "Palmerston." It is a curious foreshadowing of what actually took place fourteen years later, under the auspices of the same Minister.

Whilst Sir John Burgoyne was assisting Lord Palmerston in the preparation of his report he sent a copy of his own memorandum to the Duke of Wellington. This drew forth from the Duke the celebrated letter so much discussed when it became public, but which at the time was considered strictly private and confidential. This letter is addressed to Sir John, and is dated at Strathfieldsaye, January 9th, 1847. In it he says:—

"You are aware that I have for years been sensible of the alteration produced in maritime warfare and operations by the application of steam to the propelling of ships at sea. This discovery immediately exposed all parts of the coasts of these islands which a vessel could approach at all to be approached at all times of the tide and in all seasons by vessels so propelled from all quarters. . . . . I have in vain endeavoured to awaken the attention of different Administrations to this state of things, as well known to our neighbours, rivals in power, at least former adversaries and enemies, as it is to ourselves. I hope that your paper may be attended by more success than my representations have been. . . . . I know of no mode of resistance, much less of protection, from this danger, excepting by an army in the field capable of meeting and contending with its formidable enemy, aided by all the means of fortification which experience in war and science can suggest. . . . . I am bordering upon seventy-seven years of age, passed in honour. I hope that the Almighty may protect me from being the witness of the tragedy which I cannot persuade my contemporaries to take measures to avert."

The report of Lord Palmerston had no effect on the Cabinet. The unpopularity of any increase in the estimates was so undoubted that Ministers shrank from facing the question. Meanwhile, the Irish famine developed itself, and Sir John Burgoyne was called away to that country to preside over the Commission appointed to

administer the relief funds. In his absence the subject was dropped; but he had no sooner returned to his duties as Inspector-General of Fortifications in the autumn of 1847 than he made another effort to draw the attention of the Government to this vital question. A fresh memorandum was prepared by him, emphasizing the points he had dwelt on in his first paper, and showing in greater detail the facility of transport which the French had for passing large bodies of troops rapidly across the Channel. At this juncture, and on the very same day on which Sir John sent his second memorandum to the Master-General, the Duke's letter of the year before appeared in the "Morning Chronicle."

This publication of a semi-private letter, which, however, could not be attributed to Burgoyne, greatly angered the Duke, but it undoubtedly strengthened the hands of Ministers, who decided upon taking action thereon. On February 18th, 1848, Lord John Russell brought the question before Parliament, and proposed that the militia should be organized and that a moderate increase in the regular army should be made. To meet the cost of these measures the income tax was to be raised from sevenpence to a shilling. The proposal aroused the Manchester party, headed by Cobden, to the most violent opposition.

The French Revolution occurring just at this crisis gave the Ministers an opportunity of withdrawing from the position they had adopted, and no further action was taken in the direction of National Defence. On the contrary, the economists, carrying the war into the enemy's country, obtained a Committee of the House to inquire into the question of the naval and military expenditure with a view to reduction. The slender provision then made for the maintenance of our forces was, as a consequence, still further diminished, and the Queen's speech in opening the Session of 1849 alluded to the fact that she had been enabled to make large reductions in the estimates, owing to the peaceful state of affairs.

The Cobdenites were triumphant; everything which in any way seemed to encourage warlike aspirations on the part of the people was sternly repressed, and the country became more than ever imbued with ideas of a perpetual peace. Then came the Great Exhibition of 1851, which seemed to crown the edifice. War was at an end, and the nations of Europe, having learnt its folly, were for the future to content themselves with the peaceful rivalry of industry and manufacture. The meagre display of warlike implements in the World's Show might well have aroused a smile, and evidently pointed to the fact, recognized by all at the time, that such a display as there was could only be looked on as a survival from a more barbarous age. The nation soon received a rude awakening. The war with Russia broke out

within three years, and the melancholy state of unpreparedness in which it found the British army aroused first the astonishment and then the indignation of the country. The beautiful doctrines of peace and brotherly love were no longer in the ascendant; and as the struggle went on and deepened in intensity, so did the old warlike spirit of Great Britain once more assert itself.

The errors of the past were recognized, and when peace was again established in 1856 there was no longer the same difficulty in proposing measures for national defence. The army returned home, and brought with it the military feeling which two years of desperate strife had engendered. This spirit ran through all ranks of the people, and the pear was at length ripe. The same Minister who had many years before endeavoured to obtain a modest loan for the development of our defences was now at the head of the Government, and recent events had made still more evident to him the wisdom of the course he had then proposed. Now he determined to renew his efforts, and on a grander scale. On August 20th, 1859, a Royal Commission was issued, composed as follows:—Major-General Sir Harry D. Jones, R.E., President; Major-General Sir Duncan Cameron, Rear-Admiral Sir George Eliot, R.N., Major-General Sir F. Abbott, R.E, Captain A. Cooper Key, R.N., Colonel J. H. Lefroy, R.A., and James Fergusson, Esq., with Major W. F. Drummond Jervois, R.E., Assistant Inspector-General of Fortifications, as Secretary.

This Commission was to inquire into the state and efficiency of the fortifications then existing or in progress for the defence of the United Kingdom, and to offer such suggestions as might seem to them necessary (regard being had to the works completed and in progress, and to the ordinary number of the Royal Artillery voted by Parliament) to place the United Kingdom in a complete state of defence.

The Commissioners were directed to examine carefully the following vulnerable points, viz., Portsmouth (including Spithead and the Isle of Wight), Plymouth, Portland, Pembroke, Dover, Chatham, and the Medway; and to consider, first, how they could best be made defensible in as short a time as possible, and secondly, how they could be put in the most complete state of safety by permanent fortifications. They were also to consider what steps should be taken for protecting the approaches to Woolwich.

The Commissioners spent the autumn and early part of the winter in a careful investigation into all these matters at the various places named, and after mature deliberation furnished their report on February 7th, 1860. In this document they began by stating their reasons for believing that even the combi-

nation of fleet, army, and volunteer force was not sufficient to ensure the country from invasion. They then pointed out that the object of fortification was to enable a small body of troops or of partially trained men to contend successfully with larger numbers or better-disciplined troops. They therefore considered that by a judicious application of fortifications the forces of the country—navy, army, and volunteers—would be utilized to their utmost extent; and further, that there was no other mode of adding to our defensive power that would give an equal amount of security, and be at the same time so economical both in men and money. Such fortifications they considered should be restricted to vital points, which they explained to be the dockyards, Woolwich, and the harbours of Portland, Dover, and Cork.

Each of these points was dealt with separately, and a scheme laid down specifying site, strength of artillery, and garrison for each fort, leaving the designs and detailed plans to be prepared subsequently. The total amount required to carry out these proposals in their entirety was estimated at £11,850,000. With reference to that portion of their instructions which called on them to consider the best means of rendering these vital points defensible in the shortest time, they recommended that the works should be so designed that the main ramparts and ditches could be formed without being delayed by the building of revetments or the construction of bomb proofs and permanent magazines, so that a certain degree of protection might be obtained in three or four months, and the amount of defence subsequently increased as the works progressed.

The Government having carefully considered this report, decided upon making reductions to the extent of £3,930,000, but at the same time they added £150,000 for the provision of a central arsenal, making the revised scheme amount to £6,570,000, after deducting £1,500,000 which had been included in the original estimate for armaments and floating defences.

Some of the works originally proposed by the Commission were suppressed, and others changed in course of execution. The following may be taken as a brief summary of those that were actually carried out:—

Portsmouth.

Sea defences, outer line.

Works on the Spithead shoals, Horse Sand Fort, No Man's Land Fort, Spit Bank Fort, St. Helen's Fort, and Puckpool Battery, on the north-eastern shore of the Isle of Wight.

Gilkicker, Southsea Castle, Eastney, and Lumps Batteries.

Besides these the Needles passage was defended by the Hurst Castle Battery.

The Isle of Wight sea defences consist of the Needles, Hatherwood, Warden Point, and Cliff End Batteries, and the Golden Hall defensible barrack.

The defences to prevent a hostile landing on the Isle of Wight itself are Bembridge and Sandown Forts, and Redcliff, Yaverland, and Sandown Batteries.

The land defences of Portsmouth consist of the Portsdown Hill line and the Gosport position. The former consists of five large forts, which, as they run from east to west, are called Purbrook, Widley, Southwick, Nelson, and Wallington. At a distance of 2,500 yards in front of the latter is Fort Fareham.

In the Gosport division three forts, viz., Grange, Rowner, and Brockhurst, have been constructed between Forts Gomer and Elson, which already existed.

The Hilsea lines were in course of construction when the Defence Commission was appointed, and were completed under its auspices.

The cost of these works had been estimated at £2,800,000, but in consequence of additions and alterations they in reality cost three-quarters of a million more.

Plymouth.

The Land defences of Plymouth may be classed under three heads, viz. :—The Western, the North-Eastern, and the Staddon Heights defences.

The Western defences consist of Forts Screasdon and Tregantle.

The North-Eastern defences of Forts Ernsettle, Agaton, Knowles, Woodlands, Crownhill, Bowden, with the Egg Buckland Keep, Forder, Austin, Efford, and Laira.

The Staddon Heights position consists of Forts Staddon, Stamford, and Brownhill.

The Sea defences have in their outer line Bovisand, Picklecombe, Polhawn, and Cawsand Batteries, with the Breakwater Fort on a shoal in the centre of the Sound, behind the Breakwater.

In their inner line they have Drake's Island, Mount Edgcumbe Garden, Eastern and Western King's Batteries.

The original estimate for the Plymouth works was £3,020,000, but they were much reduced in extent afterwards, and have really cost about half that amount. The Saltash defences between the rivers St. Germain and Tamar have never been carried out, and

constitute a wide break in the land defence between the Western and North-Eastern lines.

Pembroke.

The Sea defences of Milford Haven, as executed, are—on the left shore, Fort Popton; on the right shore Forts South Hook and Hubberstone; and in the centre of the Haven, Stack Rock.

The Land defence includes only Fort Scoveston.

The original Estimate for Pembroke was £765,000, but the design was much reduced in extent. The works, as executed, have cost under half a million.

Portland.

The Portland defences consist of the Verne Fort, the Breakwater Batteries, and the Nothe Fort.

The cost has been not far different from the original estimate, viz., £630,000.

Dover.

The only new work at this station constructed under the Defence loan was Castle Hill Fort, but there were many developments of the Citadel and its outworks, and other additions.

The original estimate for these works was £335,000. They have really cost about £50,000 more.

Thames.

The defences of the Thames comprise the four forts of Coalhouse, Cliffe, Shornmead, and Slough. Much difficulty has been experienced in the construction of these works, owing to the extremely treacherous nature of the soil in which the foundations had to be sunk. This has led to largely increased expense, and to many alterations of the original design.

Medway.

The defences of the Medway comprise the forts of Garrison Point, Isle of Grain, Hoo, and Darnet. Here, as in the Thames, much unexpected difficulty has arisen in securing the foundations, and as the works proceeded the subsidence in some instances became very marked. This has led to a greatly-increased expenditure, as also to a revision of the original designs.

Cork.

The works at this point only consist of a remodelling of Forts Carlisle and Camden, and the completion of the Spike Island Fort.

The estimate was £120,000, but the actual cost has been nearly double.

It may be remarked, with regard to all these estimates, that the works as executed were in most cases of a very different character from those originally contemplated, and that the introduction of iron shields added largely to the expense.

Such is a brief sketch of the mode in which our National system of Defence has been provided for. It now only remains to point out how these various works were planned, and by whom. As soon as the money had been granted by Parliament, certain Engineer Officers were selected to design the various forts and batteries, under the control and general superintendence of Lieutenant-Colonel Jervois, R.E., the Deputy Director of Works for Fortifications. This officer had been the Secretary of the Commission, and it is not too much to say that to him the nation is mainly indebted for the magnificent series of forts with which its most vital points have been protected. Many mistakes were undoubtedly made, and much that was done in haste had to be remodelled to suit later developments of artillery; but the untiring zeal and energy, the skill and engineering ability, shown from first to last by Colonel Jervois, are above praise. His was the master spirit that crushed all opposition; that overcame all difficulties, and that infused into those around him, superiors as well as inferiors, a spirit and a devotion to the work that have rarely been surpassed.

The defences of the country as they now stand are a worthy monument to his engineering talents. He was at the same time fortunate in securing under his guidance the service of officers well qualified to carry into practical effect the general scheme he had laid down. Two of their number stand out in this respect above their compeers—Captain Crossman (now Sir William Crossman, M.P. for Portsmouth) and Captain Du Cane (now Sir Edmund Du Cane, the head of our Convict Prison Department at the Home Office), and on them fell the most important and elaborate portion of the work.

The following list shows the forts that were designed by each officer:—

Captain Du Cane.

At Dover: The reconstruction of the defences on the Western Heights, Fort Burgoyne in advance of the Citadel; the South Front and Casemated Barracks; the Officers' Casemated Barracks in Citadel.

At Plymouth: The line of North-Eastern Land Defences, including Forts Ernsettle, Agaton, Knowles, Woodlands, Crownhill (a large and important work in advance of the whole line), Bowden, Forder, Austin, Efford, and Laira.

As regards this line of works, the Russian Engineer, General Todleben, paid the designer the compliment of saying that "the man who laid them out must have had an astute mind."

The Staddon position, comprising Forts Stamford, Staddon, and Brownhill; and on the Western side of the Sound, Tregantle (partly) and Polhawn.

Captain Crossman.

At Portsmouth: Eastney and Lumps Batteries, the Golden Hall Barrack, Redcliff, Yaverland, and Sandown Batteries. The Hilsea Lines, Forts Purbrook, Widley, Southwick, Grange, Rowner, and Brockhurst.

At Plymouth: Fort Screasdon and Tregantle (partly).

At Portland: The Verne Citadel.

Captain Siborne.

The whole of the defences of the Thames and Medway, including Forts Coalhouse, Cliffe, Shornmead, Slough, Garrison Point, Grain, Hoo, and Darnet; also the Breakwater Fort at Plymouth.

Major Porter.

The sea defences of Milford Haven, including the batteries with defensible barracks of Popton, Hubberstone, and South Hook; also the Stack Rock Fort in the centre of the Haven. At Plymouth: The principal batteries defending the Sound (with the exception of the Breakwater Fort), viz., Picklecombe, Bovisand, Drake's Island, and the Mount Edgcumbe Garden Battery.

Captain Edwards.

The Needles, Hatherwood, Warden Point, and Cliff End Batteries; also the Hurst Castle extension.

Captain E. H. Steward.

The Horse Sand, No Man's Land, and Spit Bank Forts, at Spithead; and the Breakwater Fort at Portland.

Lieutenant-Colonel Fisher.

Puckpool and Gilkicker Batteries, and Southsea Castle at Portsmouth; and Spike Island, Carlisle, and Camden Forts in Cork Harbour.

As regards those of the above-mentioned works which were designed as casemates to be supplied with iron shields, they have been classed under the names of the original designers, but such alterations were subsequently made, owing to the development of

iron fortification, that the details had to be considerably changed later on. The instructions given to the officers originally engaged in these works were to provide openings twelve feet by eight feet for iron embrasures, leaving the whole question of their construction and fixture for future consideration. Most of the officers who designed the casemated works had left the War Office before this matter was definitely settled. It fell to the lot of Captain Siborne to undertake this difficult work. To him must therefore be allotted the revision of the construction of the casemates in all the works in which iron shields have been introduced.

Two officers remain to be mentioned, to whom is due the entire development of ironwork as a defensive material in casemates. These are Captain Inglis and his assistant, Lieutenant English.

The former officer had from an early date devoted himself to the subject of iron defence. He was present at every experiment carried on at Shoeburyness between 1857 and 1884 in the great duel between guns and armour. During the earlier part of the time in which the forts under the Defence Loan were being designed, he was in charge of the Works Department at Woolwich Arsenal, and it was while there engaged that he took up the question of iron as applied to forts, whether in embrasures or as forming the walls of the forts themselves. In 1867 he was made Inspector of Iron Fortifications in the War Office, and from that date he was responsible for all that was done in that branch of the work. He decided the designs of all shields, and the iron for forts at home or foreign stations, superintended their construction, and despatched them to their destination. In all this he was most ably assisted by Lieutenant English; and when he retired from the Service in 1884 that officer took his place, and held it until his recent appointment as Superintendent of the Royal Carriage Department at Woolwich. Colonel Inglis received a civil C.B. for his services in connection with iron defences.

When the works had reached an advanced stage of development a Fitment Committee was appointed, of which Colonel R. Hay, R.A., was President, to settle all the details for the service of the guns. Major E. H. Steward was the Engineer member, and on him devolved the revisions necessary in all the forts and batteries to carry out the demands and recommendations of the Committee. This was a work of a very complicated nature, involving in most instances a remodelling of the whole system of expense magazines, shell rooms, &c., to suit the service of the heavy guns which had been adopted long after the original works had been designed; and on this duty he was engaged for a considerable time after all the other Engineers had left the War Office.

The subject of National Defence cannot well be closed without some reference to what has been, and is being done to secure our coaling stations and mercantile ports from insult or destruction.

Major-General Sir Andrew Clarke, whilst Inspector-General of Fortifications, drew up a memorandum in the year 1886, in which he recapitulated the various subjects with which he had had to deal as the head of the Corps. In this he makes the following reference to the defences of the Empire :—

"It was my good fortune to succeed to the office of Inspector-General of Fortifications at a time when the deliberations and proposals of many years were about to issue in action, and the duty devolved upon me of designing and directing the execution of a system of defence for the whole Empire. The question was not a new one. It had been considered by several of my predecessors, and had formed the subject of many voluminous and able reports ; but with the exception of a few temporary and weakly-armed defences hastily thrown up under the apprehension of war with Russia in 1878, nothing had been done to protect the coaling stations, upon which, as much as upon the fleet itself, the security of British commerce in time of war must depend. It had been for three years under the consideration of a Royal Commission, and the first important duty was to consider the Report of that Commission and to advise the Government on the measures necessary to give effect to their recommendations."

Sir Andrew Clarke then continues by showing the principles upon which he had carried out his new designs, principles which in many important particulars differed greatly from those upon which the fortifications of the home dockyards and arsenals had been based. These differences may be enumerated thus :—

1st. That instead of grouping heavy guns for coast defence in comparatively small and confined batteries, they should be placed at wide intervals and at different levels.

2nd. A more exclusive reliance on earthworks in preference to masonry and iron. This, of course, was only possible where the sites admitted of the necessary space, and may be taken as a corollary of the first proposal.

3rd. The avoidance of regular slopes, angles, and other prominent features in the exterior of the works, "which serve not only to define their position, but even to mark out the positions of individual guns." In lieu of this he proposed to assimilate the works to the nature of the surrounding ground, and where practicable to merge them in the natural features, also by judicious planting still further to render them invisible from the direction of attack. He concludes by saying :—

"For the future we must rely as much upon concealment as upon resistance, and the use of earth alone admits of a combination of these

qualities. The power of small arms, which has grown concurrently with the improvements in ordnance, and the introduction of machine and quick-firing guns, have also had an important influence on the design of works of defence. Flanking fire is of less importance than formerly, deep ditches and costly caponières can in most cases be dispensed with, and much complication and expense are thereby avoided. Fortified posts will not in future be marked by batteries conspicuously frowning, or granite casemated forts with tiers of guns, rivalling rows of targets in regularity and clearness of definition. On the contrary, defences if skilfully designed will be indistinguishable from the ground on which they stand, and while they retain all the advantages of the defence, will offer no mark to the enemy's fire."

The following coaling stations are now either fortified or the works are in progress which will shortly complete their defence, and when armaments have been supplied they may be considered fairly safe from insult:—Aden, Trincomalee, Colombo, Hong-Kong, Singapore, Sierra Leone, St. Helena, Simon's Bay, Mauritius, Jamaica, and St. Lucia.

For the commercial ports of the United Kingdom a general scheme of defence has also been drawn up, and in some instances, notably the Clyde and the Tyne, detailed designs are prepared. As regards these commercial harbours, Clarke reports that four Companies of Volunteer submarine miners have been formed for the defence of the Clyde, Tyne, Mersey, and Severn, and a detachment of the new Coast Battalion of Engineers sent to each to carry out the necessary instruction. He adds that the results of the first annual training were so satisfactory that authority was granted to proceed with the formation of additional Volunteer Companies for the defence of Falmouth, and of the Humber, Tees, Tay, and Forth, and this has since been carried out. Militia Submarine Mining Corps have also been established for service at Plymouth, Portsmouth, Thames, and Medway, Milford Haven, and the Severn.

The Coast Battalionhere referred to is the outcome of a proposal made by him in 1881. He pointed out that whilst the Non-commissioned Officers of the Royal Artillery could look forward to obtain commissions in their Coast Brigade, there was no such outlet in the Royal Engineers.

"To remove this disadvantage, to encourage the enlistment of recruits possessing a higher standard of intelligence, to retain the services of our carefully trained non-commissioned officers, and to provide a nucleus of skilled officers and men to superintend the submarine mine defences of the mercantile ports, I recommend the formation of a Coast Corps of Royal Engineers to occupy the same position with respect to the Royal Engineers as the Coast Brigade to the Royal Artillery, and to be employed in training and superintending the Volunteer Submarine Mining Companies."

This scheme was approved, the result being that an establishment has been authorized of fourteen officers, twenty-two serjeants, and 104 men—the officers being taken from the non-commissioned ranks of the Royal Engineers. Part of the force has been formed, and it is being gradually extended. New submarine mining establishments have been and are still being constructed. Test rooms, observing stations, and electric light emplacements are being provided, whilst considerable improvements have been introduced in the mining apparatus. Before long our coast defence by submarine mines will be fully developed and in active operation at all the most important ports, commercial as well as naval.

This sketch of our National Defences may fitly be concluded by extracts from a letter addressed by Sir Lintorn Simmons to the "Times" newspaper in January, 1884, in reply to some severe strictures on these works in a leading article of that journal. He commences by referring to the attack which he proposes to meet:—

"As an instance of unwise expenditure Lord Palmerston's plan of home fortifications is adduced as having cost £15,000,000, while half the works are stated to be already superannuated. You also add a most serious charge against those who have advised the Government with reference to these works, imputing that by their ignorance and carelessness they had erected fortifications which are 'crumbling into dust.' . . . . To begin with, the statement that a sum of £15,000,000 has been spent on the fortifications under Lord Palmerston's loan is absolutely untrue. The estimate in the schedule of the first Act of Parliament, passed in 1862, authorising the loan, amounted to £6,190,000, which has been increased by subsequent Acts, until the amount finally authorised by Parliament came to £7,460,000. The loan is now closed, the total expenditure upon it having been £7,420,919, or rather less than one-half the amount stated by your correspondent, including more than £1,000,000 laid out in the purchase of land. As to want of foresight, the following undeniable facts speak for themselves. The Spithead forts have guns weighing 38 tons actually mounted in them, and are capable of resisting fire from similar guns. Heavier guns can be mounted in them whenever money can be found for their manufacture. In 1862 an experimental 12-ton gun had been made, but it was generally considered improbable that a heavier gun would be adopted into the service. Progressive advances, however, have been made, until in 1876 a 100-ton gun was tried at Spezzia, which has since been adopted in our service for defensive purposes. The weight of guns is not, however, the only direction in which artillery has progressed. The velocity of projectiles has been increased by means which were not even dreamt of when the loan works were nearly completed, and it is from the vastly increased penetration due to this cause (in great

measure the result of the energy and scientific skill of Sir W. Armstrong) that the sea forts run their greatest risk ; but even so, the foresight of their designers has not been at fault: they have made special provision for the outside addition of plates of iron or steel, having actually provided a tunnel in the heart of the masonry for the special purpose of securing the bolts of such plates if they should become necessary, and even made the bolt holes ready for them. It would have been a wanton waste of money at the time to have provided a greater thickness of iron than is actually on the forts. The utmost that foresight could demand in this respect has been done in providing every facility for adding to their power to resist artillery, money alone excepted. . . . . As to the land defences erected under Lord Palmerton's loan, I beg to state emphatically that although here and there accidents have occurred which may be compared to slips in a railway cutting, which in no way affect the efficiency of the railway, the works are not 'crumbling into dust,' but are perfectly sound. As to the charge of want of foresight in their construction, Plymouth and Portsmouth may both be cited as instances in which an almost unprecedented degree of foresight has been shown. There is not a Power in Europe, which since 1870 has not been occupied in reconstructing the defences of their fortified places, the experience of the war of 1870 having shown that in consequence of the great range and power of artillery, the advanced works must be pushed forward to prevent the bombardment and destruction of the position or arsenal the works are intended to protect. . . . . Although the lines for the defence of Portsmouth and Plymouth are not complete and require extension in some parts, great foresight was shown in including the Portsdown heights and the whole of the Isle of Wight within the defences of Portsmouth, and in extending those of Plymouth from Tregantle round by Crown Hill to the Staddon Heights. It is probable that if they had to be designed anew, the same ground would be occupied almost everywhere."

CHAPTER II.

The Ordnance Survey of Great Britain and Ireland. The Grand Trigonometrical Survey of India.

Origin of the Ordnance Survey—Watson and Roy—Connection of the British and French Triangulations—Base Lines on Hounslow Heath, Romney Marsh, Salisbury Plain, and Sedgemoor—Triangulations and consequent Calculations—Difficulties to be overcome—Equations of Condition—Measurement of Meridional Arcs—Formation of Royal Military Survey Corps—Colby and Station Hunting—Survey of Ireland—Base on Lough Foyle—Colby's Compensation Bars—Drummond's Heliostat and Light—Success of the latter at Slieve Snaght—Recovering Lost Stations—Different Scales adopted—Contouring—Southampton Office—Organization of the Department—Photozincograph Reproductions—Grand European Arc Measurement.

Grand Trigonometrical Survey of India—Rennell and Lambton—Everest, Waugh, and Walker—Extent of the work—Its Climatic difficulties—Obstacles in determining Altitude—Robinson—Palladio Basevi.

The Surveys which have been undertaken and executed by the Corps of Engineers during the last century are very numerous, and some of them of national importance. It is proposed to give a brief sketch of four of their number, which seem to stand out most prominently, owing either to their magnitude and interesting character or to the great difficulties encountered in their prosecution.

At the head of the list stands naturally the Ordnance Survey of Great Britain and Ireland, a work which will for ever remain an indelible record of the energy, zeal, and genius of the Corps. An unprejudiced testimony in support of this statement may be found in the "Rapport de la Commission Militaire sur l'Exposition Universelle de 1867," which calls our Ordnance Survey, "œuvre sans précédent et qui devrait servir de modèle à toutes les nations civilisées."*

The origin of the Ordnance Survey is to be found in the necessities created by the Scotch rebellion of 1745. Two Engineer

* An admirable sketch has been written by Lieutenant-Colonel Pilkington White, R.E., entitled "The Ordnance Survey of the United Kingdom," to which the reader is referred for more ample details on the subject.

Officers, one being Lieutenant-Colonel David Watson, Deputy Quartermaster-General to the Duke of Cumberland's forces in North Britain, and the other, his nephew, Lieutenant William Roy, serving under him as Assistant Quartermaster-General, and not as yet posted to the Corps, took the first steps in the matter. Roy, in his account of the work (which commenced in 1746), states that Colonel Watson was the first person to conceive the idea of making a map of the Highlands. The difficulties which had been encountered in moving troops through those wild mountainous districts, absolutely roadless, and with no clear knowledge of the passes, had shown the urgent necessity of a good military map of the country. Roy continues—

"As Assistant Quartermaster it fell to my lot to begin, and afterwards to have a considerable share in the execution of that map, which, being undertaken under the auspices of the Duke of Cumberland, and meant at first to be confined to the Highlands only, was nevertheless at last extended to the Lowlands, and thus made general in what related to the mainland of Scotland."

He apologizes for what he considers the roughness of the work (it was in reality remarkably well executed), which he attributes to the inferiority of the instruments available and the inadequacy of the money grants, saying—

"It is rather to be considered as a magnificent military sketch than a very accurate map of a country."

The war with France caused the work to be interrupted in 1755, and it was not resumed for a period of twenty-eight years.

Early in October, 1783, Comte d'Adhemar, the French Ambassador at the Court of St. James, forwarded to the Government a scheme, propounded by the French astronomer de Thury, for connecting the triangulation already executed in France, with a similar work to be undertaken in England. This was to commence in the neighbourhood of London and stretch to Dover, from which place observations were to be made across the Channel. The object of the scheme was to determine accurately the relative positions of the Paris and Greenwich Observatories.

By Royal command the work was offered to and undertaken by General Roy. The first step was the measurement of a base line on Hounslow Heath. The most approved apparatus at that time procurable was supplied, and a military working party of the 12th Regiment of Foot was furnished to assist in the operation. The line to be measured was a little over five miles in length, and the work was done three times over with different implements, the time occupied extending over two and a half months. Much general interest was excited. The King, the Master-General of

the Ordnance, and many distinguished *savants* visited the works. Sir Joseph Banks, the President of the Royal Society, who had recommended General Roy, is recorded as having been "from morning till night in the field." Where each day's work left off a plumb line was suspended to mark the point; the plummet vibrating in a brass cup sunk in the ground and filled with water. The spot was carefully fenced round and guarded during the night by a military watch.

The next two years were occupied in carrying the triangulation to the coast, during which interval the optician, Ramsden, was engaged in constructing the great three-feet theodolite which was to be employed in the cross-Channel observations. In 1787 the coast having been reached, negotiations were resumed with the French Government for the joint operations. The chief surveyor nominated on the part of the French was Jean Dominic Cassini, Comte de Thury, the Director of the Paris Observatory, with whom were associated MM. Legendre and Méchain.

On September 23rd, 1787, Roy, with his coadjutor Blagden, met the three French Commissioners at Dover, the great Ramsden theodolite having been conveyed to that station on completion. After two days spent in deliberation, the Frenchmen, accompanied by Blagden, crossed over to Calais. That party used for their observations a repeating circle of Bordas make, twelve inches in diameter, an instrument which would in no way compare with Ramsden's magnificent three-feet theodolite. When night observations were required, white signal lights and reflector lamps were flashed across the sea from the stations on either side. The cross-Channel observations continued for about three weeks, the weather proving during the greater part of the time persistently unfavourable. The principal stations on the English side were: Dover Castle and Fairlight Down, and on the French side Blancnez and Montlambert. When the necessary angles from these points had been duly observed and computed, the triangular connection between the two countries was, as General Roy records, "established for ever."

The indefatigable Roy directly afterwards undertook the measurement of a second base line for purposes of verification. The site selected was on Romney Marsh in Kent, and the length of the line was close upon five and a half miles. Lieutenants Fiddes and Bryce, of the Engineers, assisted the General in the work, which presented many difficulties, the ground being intersected by wide and deep ditches. The only other work carried on during Roy's lifetime was a small extension of the existing triangulation, two London stations, Primrose Hill and Hornsey Hill, having been established in 1788. His death brought everything to a standstill, and the work was not resumed until 1791. About this time

an opportunity occurred for the purchase of another theodolite of Ramsden's manufacture, similar in size to the one he had already constructed for the Government, but with some important improvements. The Duke of Richmond, then Master-General of the Ordnance, authorized its acquisition, and took such other steps as were necessary to carry on the Survey.

The first work on the resumption of the Survey, in the summer of 1791, was the remeasurement of the Hounslow base. The accuracy of the original operation was such that in a distance of upwards of five miles the extreme deviation between the two measurements was under six inches. The terminal points of the base were now permanently marked by iron guns sunk in such a position that the centres of their bores took up the required points. In this year the triangulation was extended southward to the coast in development of that already done, and in 1794 Hampshire was added to the network. In this year a new base line was measured on Salisbury Plain nearly seven miles long. On this base the whole triangulation of the kingdom has been made to rest. As the work proceeded westward another base line of verification was measured at Sedgemoor, in Somersetshire, in the year 1798, and by the close of the century the triangulation had been carried throughout the south of England, and into some of the midland counties.

The work thus performed may be ranked under three heads as regards the importance of the stations fixed and their resulting triangles. In the first class are those which measure the longest distances, and which form the primary triangles of the kingdom. The greatest length of a side that has been determined is that between Sea Fell Pike, in Cumberland, and Slieve Donald, in County Down, which measures 111 miles. The secondary triangulation interpolates points at shorter distances apart, ranging down to as little as five miles, and this in its turn is again broken up into smaller triangles, the sides of which vary from one to two miles in length.

The primary stations had to be selected with the greatest care and judgment, so as to form "well conditioned" triangles approximately of an equilateral character. At the same time it was of course necessary that they should be reciprocally distinctly visible. The observations at these stations were taken with 36-inch, 24-inch, or 18-inch theodolites, having high telescopic power; whilst for the secondary stations 12-inch instruments sufficed, and for the minor triangles even 7-inch answered every purpose.

The calculations based on this triangulation were necessarily very complicated. The earth being spheroidal in form, when triangles of any great extent are measured on it, the curvature of

the sides must be allowed for, and the spherical excess computed. On this point White remarks :—

"As, however, the largest triangles practicable for observation are very small proportionally to the superficies of the hemisphere, the spherical excess does not, as a rule, amount to many seconds. It requires a triangle containing 76 square miles, *i.e.*, one of 13 miles side or thereabouts, if equilateral, to produce one second of excess. In a few of the greatest triangles it exceeded 30 seconds, and in one instance the maximum recorded in our triangulation, it reached over 64 seconds."

This was not the only complication that White points out :—

"In the determination of the relative altitudes of different stations from observed vertical angles, a small correction, due to the earth's curvature, has to be applied to the apparent height of the signal station. In the same operation an allowance has also to be made for terrestrial refraction—that is, refraction near the horizon, the effect of which, owing to irregularities of atmospheric density, and temperature, is to deflect from their true direction the rays of light transmitted from the signal object to the observer's eye, and thus generally to elevate the apparent position of the object above its true position."

Another aberration to be reckoned with in certain localities is the deflection from verticality of the plumb line, due to local attraction, the result being an error in the position of the vertical axis of the instrument. These discrepancies, added to those of a minor character, such as the "personal error" of the observer, and the minute imperfections in graduation of the instrument, all have to be allowed for in the calculations based on the actual observations. The problem was, how to distribute in the most equal manner through the whole network of triangles, the small errors arising from these various causes. On this point White says :—

"Not only have the three angles of each triangle to be equated or adjusted to sum 180° plus the spherical excess, but in a round of triangles constituting a polygon, the angles at the central point have each to be corrected, so that the whole may make 360°. But besides this, the several groups of polygons are mutually interdependent, forming a continuous chain, and to work them out by different routes must necessarily give varying values to the sides. These discrepancies, then, have to be treated *en bloc*, and harmonised on a system of calculation that shall minimise the probable error of the whole, with the least disturbance of the original elements."

This gives rise to a number of what are termed equations of condition, and the larger the extent and interlacement of the triangulation, the greater the number of these different equations there must be to calculate. Such were some of the many difficulties encountered in carrying out the triangulation.

In the first three years of the present century the principal work undertaken was the measurement of a meridional arc from Dunnose to Clifton in Yorkshire. The length of this arc was over 196 miles, and the work was checked by astronomical observations. It was afterwards extended to Burleigh Moor, and more recently to the northern extremity of the Shetlands, making its total length 706 miles. Another very long arc was afterwards determined between Hensbarrow in Cornwall and Ben Hutig in the north of Sutherland. This measured 2,982,835½ feet, or nearly 565 miles. In July, 1805, the civilian Surveyors who were employed on the Ordnance Survey, were formed into a Royal Military Corps, in virtue of a King's Warrant issued as far back as 1800. The establishment consisted of one Chief, one First Assistant, one Second Assistant, eight First Class, six Second Class, eight Third Class, and six Cadet Surveyors and Draughtsmen. This Corps was abolished in 1817.

During the first decade of the century, the triangulation of the country was steadily pushed on, and at its close nearly the whole of England had been embraced, as well as the eastern side of Scotland. During the same period much progress was also made with the minor triangulation, working from church steeples, lighthouses, and other conspicuous objects. In 1811, however, the service was seriously impeded from want of money, the war with France then raging having absorbed all available resources.

After the conclusion of peace the survey was gradually resumed, and in 1823 we find there were seven Engineer officers with a staff of assistants engaged in the service. During this time Captain Colby, who was at the head of the operations in Scotland, succeeded in infusing much of his own vigour into the spirit of those employed under him. A very graphic picture of the laborious character of the work and the marvellous energy of the men is given in a journal written by Lieutenant Dawson, who, with Lieutenant Robe, was at the time associated with Colby. It refers to the season of 1819, when the Survey party was triangulating in Scotland. They had established themselves on the top of Corrie Habbie in Banffshire, in the centre of a very mountainous country. It will be seen by the extracts which follow that the duty was one causing the greatest fatigue, accompanied by exposure—a life which must have been most trying to the strongest constitution, and likely to prove extremely detrimental to those who were in any way delicate. The work described is that of "station hunting." The points to be selected were necessarily on the tops of hills, and, where possible, on mountain peaks. In order to determine which were the most suitable it was necessary to explore every probable ridge, and this in a district where it

seldom was advisable to make use of the roads, as these naturally avoided the ground most suitable for triangulation purposes.

"Friday, 23rd July. Captain Colby took me and a fresh party of the soldiers on a station hunt, to explore the country to the westward and northward of west. Our first halting place was to be Grantoun, at a distance of twenty-four miles, and Captain Colby having, according to his usual practice, ascertained the general direction by means of a pocket compass and map, the whole party set off, as if on a steeplechase, running down the mountain side at full speed over Cromdale, a mountain about the same height as Corrie Habbie" (this was about 2,200 feet high), "crossing several beautiful glens, wading the streams which flowed through them, and regardless of all difficulties that were not absolutely insurmountable on foot. Sometimes a beaten road would fall in our course, offering the temptation of its superior facilities to the exhausted energies of the weary members of our party, and in such cases freedom of choice was always allowed them. Captain Colby would even encourage such a division of his party, and the spirit of rivalry which it induced, and took pleasure in the result of the race which ensued. Arriving at Grantoun in about five hours and a half, we dined there and proceeded afterwards along the valley of the Spey, by the high road to the Aviemore Inn to sleep. The distance travelled by us that day was calculated at thirty-nine miles."

"Saturday, 24th July. Started at nine o'clock, I was dreadfully stiff and tired from the previous day's scramble, and with difficulty reached Pitmain (thirteen miles) to dinner. . . . . Garviemore Inn, distant eighteen miles, was to be our next stage, and I really thought it was more than I could accomplish that day, but Captain Colby said it was not. It was his intention, however, to leave the beaten road immediately, and crossing a rough boggy tract of country to the northward, to gain the summit of Cairn Derig, a mountain about 3,500 feet high and about ten miles distant, and having built a large pile of stones upon it, to proceed again across the country to Garviemore. I kept pace with him throughout the remainder of the day, and arrived at the inn at half-past eleven o'clock at night, much more fresh than at the end of our first stage the day before.". . . . . "The distance travelled that day was forty miles."

"Sunday, 25th July. There being no church, we strolled out soon after breakfast to see the country. From the opposite side of the road to the southward, the ground rises suddenly to the height of about 1,500 feet. This we ascended and found, as is frequently the case, an eminence of greater elevation behind it. Having gained this second elevation, a third appeared, and so on to others in succession, though frequently in pursuing our straight course, we had to descend rocky valleys, and thus to lose in a quarter of an hour the elevation which it had cost half an hour's severe climbing to attain. In this way, however, we at length reached the summit of Bui-Annoch, a mountain rising suddenly from the wooded shores of Loch Laggan, to the height of about 4,000 feet. From that point we gained a splendid view of the western hills for which we

were bound, a white and serrated range extending from the west to the northward as far as the eye could reach." . . . . "I have traversed Switzerland, and the view of the Alps is in my opinion scarcely more imposing than this." . . . . "After dwelling upon it for an hour or two, and refreshing ourselves with a copious draught from a pure spring surrounded with icicles and snow, we returned to Garviemore, having walked about four-and-twenty miles, and attained so great an elevation on the day which should have been our day of rest."

"Monday, 26th July. The party started soon after daybreak, crossed Corrie-arrack 2,000 feet high, descended on Fort Augustus and proceeded in a north-westerly course to Cluny, where they got neither beds nor supper."

"Tuesday, 27th July. Breakfasted at Invershiel at the head of Loch Duich, ascended and built a conical pile on the summit of Scour-Ouran a high mountain to the north-east, and returned to the inn at Invershiel to sleep."

"Wednesday, 28th July. Crossed the Maum-Rattachan to Kyle-Rhea, thence to Broadford in Skye and on to Sconser, a distance of thirty-two miles."

"Thursday, 29th July. Attempted to reach the summit of the Coolin Hills, but were completely foiled in the attempt. Not being provided with ladders or ropes, the perpendicular rock at the summit baffled our efforts for several hours to find a crevice by which to ascend it. We gained, however, a ridge which reaches out from the perpendicular cliff with a superb column at the extremity of it; and so narrow is the ridge that we were obliged to sit astride upon it, in which position little more than the strength of an infant was required to hurl a stone to the bottom of the corrie on the south side without impinging on the face of the cliff, a depth of about 2,000 feet."

"Friday, 30th July. Went to Portree, ascended a range of hills above it, and erected a pile of stones upon one of them, and returned to Sconser."

"Saturday, 31st July. A bright morning at daybreak, and we were on foot again to make a fresh attempt on Scour-na-Marich, another head of the Coolin range which Captain Colby had singled out for the purpose on the former occasion, and this time our efforts were crowned with success. Having built a large pile upon it we returned to our inn to breakfast, which by that time we stood much in need of, and hiring a boat we proceeded direct to Jeantoun, at the head of Loch Carron."

In 1825 the Survey of Ireland was begun. This was pushed forward with great vigour, and a large augmentation of the staff was granted for the purpose. The reason was that the Government desired to give their valuators accurate details, so as to enable them to apportion more correctly the local burthens. These had hitherto been levied by Grand Jury assessments, and were the cause of many and bitter complaints, owing to their inequality.

It was, therefore, considered most advisable that the divisions of the country should be accurately defined. The Committee reported that it was expedient to use much greater despatch to this work than had been practicable in the Trigonometrical Survey of England. They recommended that every facility in the way of improved instruments should be given to the Ordnance officers by whom the survey was to be conducted and concluded, with the hope that the great national work, which was projected "will be carried on with energy as well as with skill, and that it will when completed be creditable to the nation and to the scientific acquirements of the age."*

The most important operation in this new survey was the measurement of the base. A line was laid out on the eastern shore of Lough-Foyle, near Magilligan Point, in the County of Londonderry, which was the longest base that had yet been adopted. Its measurement was effected by means of a set of compensation bars designed for the purpose by Captain Colby. The principle that had hitherto been adopted in measuring with either rods or chains, in order to ensure great accuracy, was first to secure the measure from any change in length owing to bending or twisting, and secondly, by an exact record of temperature obtained by placing thermometers in contact with it, to enable the observer to make the proper allowance for expansion or contraction.

This involved many minute observations and calculations, and even then was not always free from error. Colby now introduced what have since been known as his self-compensating bars, whereby all changes of length due to variations in temperature were balanced by the employment of metals of different expanding powers.

The principle was more or less an adaptation of the gridiron pendulum devised by Harrison. Two bars, one of brass, the other of iron, were firmly fixed together at the centre, but left free to expand or contract from that point towards their respective extremities. At each end was a flat tongue, moving freely on conical pivots, by which it was attached to the bars. It was so set that whatever the amount of differing contraction or expansion of the two bars, a point in the tongue remained stationary. This, which was called the compensated point, was marked with a dot on a silver pin. In use it was thought advisable that the compensated points of the adjacent bars should never be brought into contact, for fear of a disturbance in their exact position. They were therefore kept six inches apart, and that distance was

* McLennan's "Memoir of Thomas Drummond," p. 65.

ascertained by microscope measures, rendered compensating on the same principle. These consisted of three microscopes, embraced by iron and brass bars—one being in the centre, and the other two at the extremities, at three inches distance. The outer microscopes formed small angles of inclination on the unequal expansion or contraction of the bars, as in the case of the steel tongues to the measuring bars, and the compensating point was so adjusted as to be in the outer focus of the object-glass. This adaptation of compensating bars, combined with compensating micrometer microscopes, ensured the work being carried out with the utmost exactitude. We have a good account of the mode of procedure from Drummond, who wrote a description of it to Sir John Herschel. The astronomer had been present at an early stage of the operation, and had been so struck with the ingenuity of the apparatus, and its extraordinary precision, that he took a sketch of it, and afterwards referred to Drummond for further information on the subject. The following extracts are from his reply :—

. . . . "The distance is about $7\frac{4}{5}$ths miles, and the error, I believe, not to exceed 2 inches." . . . . "The line is intersected by the river Roe, not deep, except for a few yards, but having a width of 480 feet. We looked forward to the crossing of this river with some degree of apprehension ; it was necessary to drive piles the whole way across to support the bars, an operation of some difficulty and expense, and although every precaution was resorted to in order to render them steady, it was not sufficient to prevent the tremulous motion produced by the current. It was therefore considered indispensable that this portion should be measured twice. On the first occasion we commenced at low water, having the advantage of shallow water, but the disadvantage of a stronger current ; on the second we began at high water, in order to vary the circumstances as much as possible. The difference was $\frac{1}{3\frac{1}{8}}$ inch between the two measurements. Again, at the commencement of the operation, before we had become expert at the use of the apparatus, when we proceeded very slowly, it was thought desirable to remeasure the first three or four hundred feet. You may recollect that you and Babbage arrived at the very moment when we were concluding the experiment, and that there was scarcely any perceptible difference between the terminating dots." . . . . "With respect to the extremities of the Irish base, the most satisfactory precautions have been taken to secure them. The bases, about 3 feet under the surface, consist of four slabs about 3 inches thick, and 7 feet long by $3\frac{1}{2}$ broad. These are laid transversely, while longitudinally two blocks of compact sandstone, weighing about (I think) 17 or 18 cwt., and being somewhere about 4 feet square, are placed above them, the whole firmly cemented with Roman cement. . . . . There is little to attract attention, and there is sufficient strength to resist any ordinary attempts of the

country people to remove them supposing them to be so inclined, which I believe they are not. Nothing but the mandate of Capt. Rock or Dan. O'Connell would expose them to destruction."

The locality for the base was very judiciously selected, being extremely level, and with the exception of the river referred to, free from obstacles. It was only on an average about 18 feet above mean sea level. The measurement was commenced on September 6th, 1827, and continued till October 25th, when it was suspended for the season. It was resumed on July 7th, 1828, again suspended from July 25th to September 13th, for harvest operations, and finally completed on November 20th, 1828.

The compensation bars used in the measurement of the base were, as already stated, the invention of Colby; but before they could be adapted many experimental details had to be determined. These were carried out by Lieutenant Drummond, and are thus described by Portlock:—

"The laborious experiments which were made for comparing the standards with the recognised standards of measure, for determining the exact position of the compensated points of the measuring bars, and for examining various descriptions of varnishes in order to fix upon one which would equalise as much as possible in the two metals the times required for acquiring any change of temperature (a matter of the utmost importance, as upon that equality depends the perfection of the compensation action, whilst the rapidity of heating and cooling is very different in different bodies) were carried on by Lieutenant Drummond."

The plan which Drummond had been endeavouring to bring to perfection, referred to above, was to form a ribbon of mica, this material being almost unaffected by variations of temperature. The obstacle which prevented the successful application of the idea was that the mica ribbon would have to be supported and kept strained by weights. Such a system could not be adopted in a manner that would render the measurement uniformly accurate. There is no doubt that Colby's compensating rods were a wonderful improvement upon such a device.

It is somewhat interesting, as showing the extreme care taken in the measurement of the various bases in the Ordnance Survey, to quote some of the results of remeasurement.

The original Hounslow Heath base, as measured by Roy, in 1784, with glass rods, was computed at 27,405·06 feet. When remeasured with steel chain, in 1791, it was 27,405·38, and when deduced by computation from the Irish Lough Foyle base, through the whole chain of intervening triangulation, it came out as 27,405·83 feet. Such a result is quite unparalleled in any other survey in the world.

The Salisbury Plain base, measured by steel chains in 1794, was 36,575·64 feet long. When remeasured by Colby's compensation bars in 1849, it was 36,577·95, and when computed from the Lough Foyle base, it was 36,577·34—a striking proof of the accuracy of the bars, and also of all the intermediate triangulation.

The Scotch base on Belhevie Sands, near Aberdeen, was measured in 1817, with Ramsden's steel chain, and was 26,516·66 feet long. This, when computed from the Lough Foyle base, became 26,518·99 feet.

The Rhyddlan Marsh base, when measured in 1806 by steel chain, was 24,515·2 feet, and when computed from Lough Foyle, was 24,518·2 feet. The least accurate of the whole was that at Misterton Carr, which, when measured with steel chain in 1801, was 26,343·72 feet long, and when computed from Lough Foyle was 26,350·76, a difference of seven feet in about five miles.

It is an interesting fact to note that the most accurate measurement of all was the very first attempted, and Drummond afterwards remarked, with a feeling of regret, that all the scientific development that had been applied to the mechanism for measuring since Roy's days had failed to reach the marvellous precision of his first base taken with glass rods.

Although Drummond had failed to produce any device superior to Colby's compensation measuring bars, the Irish Survey was destined to be the means of bringing to perfection two of his inventions. One was his heliostat, and the other the light to which his name has been given.

The original form which he adopted for the heliostat was a mirror connected with two telescopes, one of which was to be turned on the station of observation, and the other on the sun. The mirror was so set in connection with the telescopes that when the latter pointed to the sun the mirror reflected its rays to the station of observation. This principle he afterwards simplified into a mirror, connected with a stand by a ball and socket joint. A small flat brass ring was placed some twenty-five feet from the heliostat in alignment with the station of observation. The operator had only to move the mirror until it reflected the sun's rays on the ring; this ensured the flash being thrown in the direction required.

He himself has given an account of the steps which led him to the discovery of his lime light, in a paper "On the Means of Facilitating the Observation of Distant Objects in Geodetical Operations," published in the "Philosophical Transactions" of 1826. After describing the Bengal and white lights used by Roy for his cross-Channel observations, and the Argand lamp

employed in similar work in 1821, he proceeds to detail the steps which led him to the production of the lime light :—

"With this object in view I at first endeavoured to make use of the more brilliant pyrotechnical preparations, then phosphorus burning in oxygen with a contrivance to carry off the fumes of phosphoric acid, were tried, but the first attempts with these substances promising but little success, they were abandoned. The flames, besides being difficult and troublesome to regulate, were large and unsteady, little adapted to the nature of a reflecting figure, which should obviously, when used to the utmost advantage, be lighted by a luminous sphere, the size being regulated by the spread required to be given to the light. This form of the focal light it was manifest neither could be obtained nor preserved when combustion was the source of the light, and it was chiefly this consideration which then led me to attempt applying to the purpose in view the brilliant light emanating from several of the earths when exposed to a high temperature, and at length I had the satisfaction of having an apparatus completed by which a light so intense was produced that when placed in the focus of a reflector the eye could with difficulty support its splendour even at the distance of forty feet, the contour of the reflector being lost in the brilliancy of the radiation. To obtain the requisite temperature I had recourse to the known effect of a stream of oxygen directed through the flame of alcohol, as a source of heat free from danger, easily procured and regulated, and of great intensity."

The paper then enumerates several incandescent substances, with which he experimented to ascertain their relative intensities, after which he continues :—

"Of these substances and also of their compounds with one another, lime appearing to possess a decided superiority, my subsequent experiments were confined to it alone, and by a more perfect adjustment of the apparatus by bringing the maximum heat, which is confined within narrow limits, exactly to the surface of the ball, and by using smaller balls than those employed in the early experiments, a very material increase of light has been obtained. The mean of ten experiments made lately, with every precaution, gives for the light emitted by lime, when exposed to this intense heat, eighty-three times the intensity of the brightest part of the flame of an Argand burner of the best construction, and supplied with the finest oil."

Such was the first form taken by the Drummond light, and it was not long before its value was proved. The triangulation was started in the autumn of 1825, and the first station was established on the Divis mountain near Belfast. It was required to take an observation to the highest hill of Innishowen, called Slieve Snaght, a distance of sixty-five miles, to connect the north of Ireland with the western islands of Scotland. For this purpose a conspicuous mark was erected on that hill on August 23rd, and from

that date until October 26th fruitless efforts were made to secure an observation. The mountain was so constantly and so completely enveloped in haze that nothing was visible. Drummond was now sent with his heliostat and the new light to attempt to conquer the difficulty. He ascended Slieve Snaght and prepared to display his light. It had been arranged that he should turn it on to the Divis station at a fixed date and hour. The result is thus given by Larcom:—

"To guide the observer" (from Divis) "one of the lamps formerly used, an Argand in a lighthouse reflector, was placed on the tower of Randalstown Church, which happened to be nearly in the line at fifteen miles. The time approached and passed, and the observer had quitted the telescope, when the sentry cried, 'The light!' and the light indeed burst into view, a steady blaze of surpassing splendour, which completely effaced the much nearer guiding beacon. It is needless to add that the observations were satisfactorily completed, the labours of a protracted season closed triumphantly for Drummond, and the Survey remained possessed of a new and useful power."

Aided by these inventions the triangulation of Ireland was rapidly pushed forward, and the entire survey completed in about seventeen years.

Colonel Portlock, in his memoir of Colby, gives an amusing description of the difficulties sometimes encountered by the later surveyors in finding stations that had been established by their predecessors, and subsequently lost. After describing how the station at Fairlight, which had been at a mill, was recovered, the mill itself having been removed, he continues:—

"The writer of this memoir, having on several occasions been required to get over such difficulties, has met with many examples of the erratic character of mills, though unfortunately they did not always leave evidence equally tangible of their wanderings; and has been driven almost to despair when he has appealed to human testimony. As a preliminary towards discovering the old signal staff at Holyhead, he sent for the man who for many years had been in exclusive charge of it, and was informed by him that it had stood 'just at that spot, sir, where those stones are; why, sir, I watched it for many years and saw it removed, and those stones were exactly at its foot.' Who could doubt such precise information? more particularly as the place seemed a very fitting one. The theodolite was put up, but alas! all the angles were wild and evidently pointed to a very different locality. It was gradually moved in this direction and the angles began to improve, whilst the signal keeper kept loudly protesting that it was leaving the right spot. At length the angles became consistent, and on removing some of the surface stones, amidst the protestations of the keeper that it would be useless to do so, the butt-end of the old staff was found, and the unwilling keeper forced to admit his error. On another occasion, in Anglesey, the published description represented the

station to have been on the *highest point* of the hill; but time and agricultural improvement had so changed the surface that two small adjacent peaks appeared instead of one, and they were so vexatiously similar in height and fitness for the purpose, as to defy selection. Well, the first person who came up was the farmer who for many years had been tenant of the land, and he at once pointed out one of the peaks as the true site, declaring that he remembered well when the party was there, and a gentleman who had lost his left hand* was constantly looking through a glass. Such testimony was irresistible, but the telescope having been put up, flatly contradicted it; then came a neighbouring gentleman, who said he had frequently visited Capt. Colby and looked through the telescope, and with even greater confidence pointed to the other peak as the right one. The telescope was shifted accordingly, but, strange to say, it denied the truth of the squire's statement. Here was a dilemma, falling between two stools, and not another in sight to rest upon. In such a condition of perplexity, it was natural to appeal to the experience of Colonel Colby, and from him was received the laconic reply, 'Never mind the testimony of anyone, trust to your instrument.' And in truth, this advice, though conveyed in terms of characteristic brevity, was most wise, and by following it a spot was soon found where the angles perfectly harmonised with those of olden time, although the plough had worked so great an alteration in the relative condition of the surface."

In 1852, the grand primary triangulation of the United Kingdom was brought to completion. During all the later years it had been followed at uncertain intervals, first by the subsidiary triangulations, and afterwards by the detail survey. The earliest scale adopted was that of one inch to the mile, although isolated patches of survey had been carried out on a much larger proportion. This continued until the year 1824, when the scale of six inches to the mile was adopted for Ireland, and in 1840 it was introduced into England. By this time the latter country, with the exception of the six northern counties, had been surveyed on a scale of two inches and published on a scale of one inch. A small portion of Scotland had also been surveyed on a similar scale.

The six-inch survey continued as the established scale till 1851, when a Committee of the House of Commons recommended a return to the one-inch. This suggestion caused so much dissatisfaction, that in 1853 the Treasury took further advice, and found that the weight of scientific opinion was not only opposed to the reduction, but on the contrary was in favour of a considerable enlargement. This led to the appointment of a Departmental Committee under Sir J. Burgoyne, at the suggestion of which the scale of $\frac{1}{2500}$ or 25·344 inches to the mile, was adopted, and has ever since

* This was Colby, who had had his left hand shattered and amputated, the result of an accident.

remained that on which the Survey has worked. Up to this time the large towns had been plotted on a scale of five feet to the mile, but it was now decided that in the case of towns, the population of which exceeded 4,000, the scale of $\frac{1}{500}$, or 126·72 inches to the mile, should be adopted.

The result of all these changes is thus summarized by White :—

"There is (1) the town map $\frac{1}{500}$ of the actual linear measure of the ground, nearly 127 inches to the mile, commonly called the ten-foot map. There is (2) the 25-inch $(\frac{1}{2500})$ map, the true cadastral unit of the survey. On this scale the areas of every parcel of land are computed and published, and a square inch of the paper represents as nearly as possible one acre on the ground. We have (3) the six inch to the mile, or what used to be termed the County map $\frac{1}{10560}$ of actual size. And (4) comes the general military or geographical map of the country on the scale of one inch $\frac{1}{63360}$."

The levelling work or hypsometry of the survey was carried out thus. The great trunk roads throughout the kingdom were first levelled from a datum point, and the network of lines determined enabled the intervening spaces to be easily levelled. The work was afterwards computed from a fixed datum, which in England is taken as the level of mean tide at Liverpool. The datum for Ireland is a point fixed in 1837 on Poolbeg Lighthouse, in Dublin Bay, which indicated at that time the low-water mark at spring tide. From these levels the whole country has been contoured at intervals of 100 feet up to 1,000 feet, and after that at intervals of 250 feet.

The head-quarters of the Ordnance Survey were established in the Tower of London until the great fire of 1842, after which they were removed to Southampton. The chief officer is termed the Director, under whom are seven others. Two of these divide the executive duties between them, and the remainder supervise the various departments, which include the secondary and tertiary triangulation, the photography, zincography, engraving, colouring and electrotyping processes. The country is divided into ten divisional commands for England and Wales, and one for Ireland. Scotland, being finished, has no separate command. All the detail outdoor work is carried out in these districts. There are four Companies of Royal Engineers specially raised for survey purposes. The number of persons, military and civil, engaged in the Department in 1885 was 3,240, exclusive of temporary taping boys.

In addition to the work thus indicated the Department has at various times furnished officers to carry out foreign and colonial surveys, and other duties of a cognate character. Under the Reform Bill of 1832, Lieutenants Dawson and Drummond prepared

the maps required by the Boundary Commission. In 1868 six Royal Engineer Officers of the Survey rendered similar assistance to the Royal Commission on Parliamentary Boundaries, and in 1885 very heavy work was thrown on the Department, owing to the Redistribution Bill of that year; no less than 453,000 maps having been supplied to the Commission. In this instance eight Royal Engineer Officers were appointed either as Commissioners or Assistant-Commissioners.

The reproduction of facsimiles of ancient MSS. by photo-zincography has been largely carried out by the Survey Department. This work grew out of the discoveries made by Sir H. James, R.E., applying photography to the copying of maps. Captain de Courcy Scott, R.E., added many improvements to the process by which copies of maps or documents were produced in carbon print. The most important of these works is the facsimile of the Domesday Book, published in thirty-two volumes, containing 1,660 pages. This was completed in 1863, and was followed by the copy of the original black letter Prayer-Book of 1636; since then numerous other important additions have been made to this branch of Royal Engineer duties.

Possibly the most interesting work ever undertaken by the Survey Department was the connection of the triangulation of the United Kingdom, with that of Russia, Prussia, Austria, France, and Belgium, to permit the computation of the geometrical length of a grand arc of parallel in latitude 52° North between Valentia in the south-west of Ireland, and the Russian station of Oursk on the Oural, the line so computed to be compared with the same distance measured astronomically. The English party was placed under the command of Lieutenant-Colonel Cameron, R.E. White thus describes the operation:—

"The observations were to be duplicated by the delegates of both nations (English and French), each side using precisely the same stations, and sharing the cost of erecting the necessary observatories. We made use of the old Ramsden 3-feet theodolite, and of a 24-inch and an 18-inch instrument. Our French colleagues stuck to their repeating circles. Some fine specimens of scaffolds to carry the theodolites were erected by Mr. Beaton (an ex-serjeant of Engineers), some of which were in most difficult positions, and exhibited great skill in their construction. The usual signals, including heliostats by day and reflecting lamps by night, were made use of. We began our work on the Kentish coast in May, 1861, and our observing parties crossed over to France in the summer, one or other of them remaining there from August to the end of January, 1862. The weather turned very foggy and stormy towards the end of the time, and on the 10th November, at Harlettes station, the scaffold staging, 80 feet high, which had been erected by the French officers, was blown down in a very severe gale.

Our Sappers, however, who were encamped there speedily restored it. Mount Kemmel, near Ypres, in Belgium, was the last station observed from our 24-inch instrumental party; this was done towards the end of November."

Thus was completed the British share of a work which Professor Airy described as "probably the longest arc of parallel that man will ever measure."

Some idea of the progress now being made in the Ordnance Survey may be gathered from the fact that of late the field work has exceeded three million acres per annum, and that in the year 1884 upwards of 400,000 maps were turned out at Southampton, and over 40,000 at Dublin. The mere catalogue forms a bulky volume of 361 pages.

This sketch cannot well be concluded without some mention of the men who have devoted their lives, their talents, and their energies to its service. Foremost among them stands Colby, who for so many years was attached to the work, first as an assistant under Mudge, and afterwards as himself the chief. He had been appointed to this service almost immediately after he obtained his commission in 1801, at the special request of Mudge, the following being an extract from a letter addressed by him to the Master-General, on the subject:—

"I find him on examination well grounded in the rudiments of mathematics, and in other respects perfectly calculated to be employed in this business. I beg to point out to your Lordship the expediency of Lieutenant Colby being attached to me with some degree of permanency, and to request you will assign him to my orders on that principle."

In the following year he met with an accident, which nearly proved fatal at the outset of his career, a pistol having burst in his hand. One of the fragments struck him on the forehead, causing a deep dent which he bore with him to the grave. His left hand was frightfully shattered, and had to be amputated. Major Mudge thus wrote of the accident to General Morse:—

"I deferred addressing you on the subject till my arrival at Liskeard, for I was apprehensive that with a relation of the accident, I should have to report his death. It is, however, with a degree of satisfaction proportionate to my regard for this most excellent, but unfortunate young man, that I have to state the confident expectations entertained of his recovery."

Colby continued to serve under Mudge during the remainder of that officer's connection with the Survey, which was only terminated by his death in 1820. During the latter part of the time Mudge had been Lieutenant-Governor of the Royal Military Academy, consequently much of the superintendence of the

Survey work fell to Colby's lot, he being Mudge's principal assistant. The nomination of the new Superintendent was in the hands of the Duke of Wellington, then Master-General of the Ordnance, and he, before deciding upon the selection, referred the question to several leading men of science. Their opinion was given unanimously in favour of Colby. Amongst others he applied to Dr. Hutton, the celebrated mathematician. "Do you think Captain Colby the best person to take charge of the Survey?" "The very best," replied the Doctor, who thereupon was about to give his reasons for the reply. "Thank you," said the Duke, "that is enough; you have fully answered my question, and I am satisfied." Colby was therefore appointed to the important office after a service in the Department of eighteen years. A graphic description has already been quoted in this Chapter, written by Lieutenant Dawson, of his experiences under Colby in the arduous duty of station hunting in Scotland. This account proves clearly the wonderful vigour and indomitable perseverance with which he carried on his duties; but it was not until he reached the highest post that he was able to show his full capabilities. Chief among these must be named the power he had of discovering and developing talent, and of selecting the best men to serve under him. It is curious and instructive to note how many of them have distinguished themselves, not only in that department of science, but also in other fields of work. Such names as Drummond, Larcom, Dawson, Portlock, Vetch, and others constitute a galaxy of talent, the gathering together of which was due to the keen perceptions of Colby. Nor was it only in selecting the best men that he showed his powers; he had also the gift of evoking to the utmost the particular talents of each of his subordinates. He was utterly free from jealousy, and indeed loved to see his youngsters, as he termed them, puzzling out a scientific problem, the main suggestion of which had first emanated from himself. Indeed, so careless was he of his own reputation, that he allowed more than one of his inventions to be ascribed to those who had only worked out the details under him. A notable instance of this may be quoted in the compensation bars, now justly known as his, but which for a long time were attributed to Drummond. Fortunately for Colby's memory, Colonel Portlock, who served so long under him, has, in his memoir of his chief, clearly proved that the invention of the principle was purely by Colby, and that Drummond, although he worked out the details with the intelligence and scientific precision to be expected from him, did not at first think that it could be successfully applied. The following is Portlock's account of the matter:—

"Everyone who knew him (Colby) in those days must remember, how rapidly he moved or ran through the streets, rarely relapsing into a simple walk; and it was thus that I met him rapidly descending Tower Hill, when he took my arm, and with the usual 'Come, my boy, I have something to talk to you about,' carried me with him to the Map Office in the Tower, which was not only the office for the business of the Survey, including the engraving of the maps, but also contained the private apartments allotted to Major Colby, as director of the work. When once there I was detained for the evening, and after dinner Major Colby fully explained to me the idea he had formed of a compensation measuring rod." . . . . "Having listened attentively to Major Colby's explanation of the principle of his proposed compensation measuring rods, I felt satisfied that it would succeed in practice; but such was not the opinion of all the members of our little senate, as Lieutenant Drummond was in the first instance more disposed to go on with his own enquiries, and expected a better result from them than from the proposed bars of our chief."

The great Survey of Ireland, performed as it was in an incredibly short space of time as compared with all preceding operations of the kind, is an undying monument to the administrative powers of Colby; but it is by no means the sole record of his skill. Both before and afterwards he was engaged in all the most important survey work of the United Kingdom. In 1821 he was selected, with Captain Henry Kater, to join with the French astronomers, Arago and Matthieu, to repeat the operations for the connection of the meridians of Paris and Greenwich, which had originally been carried out by General Roy in 1788. In 1838 Colby, now with the rank of Colonel, returned to England from his lengthened supervision of the Irish Survey, and the remainder of his time at the head of the Department was principally devoted to pushing forward the Scotch Survey. In 1847 he retired into private life as a Major-General. He died in 1852, in the 69th year of his age.

Reference has been made to the names of Drummond, Larcom, Portlock, Dawson, and Vetch, who were worthy lieutenants to their energetic chief, and who have all left their mark on the great work. There is, however, one of later date which has not yet been mentioned. It is that of a man who has earned for himself a European reputation in all matters connected with the higher branches of mathematical and astronomical science—Colonel A. R. Clarke, C.B., F.R.S., and gold medallist of that Society. This is what the "Times" said of him on the occasion of the medal being awarded:—

"The medal which, in accordance with the usual rule has been devoted to mathematics and physics, has this year been awarded to Col. A. Clarke for his comparison of standards of length, and determi-

nation of the figure of the earth. Col. Clarke was for some 25 years the scientific and mathematical adviser for the Ordnance Survey, and while acting in that capacity he became known to the whole scientific world as possessing a unique knowledge and power in dealing with the complex questions which arise in the science of geodesy. His laborious comparison of the standards of length, carried out under General Sir Henry James, R.E., are universally regarded as models of scientific precision. His determination of the ellipticity and dimensions of the earth from the great arcs of meridian and longitude involved a very high mathematical ability and an enormous amount of labour. The conclusion at which he arrived removed an apparent discrepancy between the results of pendulum experiments and those derived from geodesy, and is generally accepted as the best approximation hitherto attained as to the figure of the earth."

The Survey of India.*

The Survey of India is a work of purely European origin, nothing of the kind having been attempted under the Asiatic Governments which held sway in that country before the advent of the British power. It began by the survey of various portions of the coast visited for purposes of commerce, and was principally the work of naval men. To this was gradually added what little was known of the adjacent inland country.

From the results of these efforts, a general map of India was compiled by the French geographer D'Auville, and published in the year 1752. This map remained the standard work of reference until the results of Rennell's labours superseded it. This officer, who has been called the Father of Indian Geography, had commenced his career as a naval officer, and was one of those selected for appointment to the Corps of Bengal Engineers on its first formation in 1767.† Rennell's system of operations, which was confined to the Bengal Presidency, consisted of a survey of the various connecting routes of the country, combined with astronomical observations for longitude and latitude. His system was gradually adopted in other parts of India, and constituted the only survey of the country until the close of the eighteenth century.

The result of the Mysore campaign of 1799 having added largely to British possessions in Southern India, Major Lambton, of the 33rd Regiment, drew up a project for a general triangulation of the district. In this he was strongly supported by his

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* The following sketch has been based on an address delivered by General J. F. Walker, C.B., R.E., to the Geographical Section of the British Association at Aberdeen, in 1885.

† For a brief sketch of Rennell's life, *vide* Part IV.

commanding officer, the future Duke of Wellington, and the scheme received the sanction of the Madras Government. General Walker, on this point, says:—

"The Great Trigonometrical Survey of India owes its origin as such, and its simultaneous inception as a geodetic survey, to Major Lambton, who commenced operations by measuring a base line and a small meridional arc near Madras, and then, casting a set of triangles over the southern peninsula, he converted the triangles on the central meridian into a portion of what is now known as the Great Arc of India, measuring its angles with extreme care, and checking the triangulation by base lines measured at distances of two to three degrees apart in latitude. His principal instruments were a steel measuring chain, a great theodolite and a zenith sector, each of which had a history of its own before coming into his hands. The chain and zenith sector were sent from England with Lord Macartney's embassy to the Emperor of China, as gifts for presentation to that potentate, who did not appreciate their value, and declined to accept them. They were then made over to Dr. Dinwiddie, the astronomer of the embassy, who took them to India for sale. The theodolite was constructed in England for Lambton, on the model of one in use on the Ordnance Survey. On its passage to India it was captured by the French frigate the *Piemontaise*, and landed at Mauritius, but eventually it was forwarded to its destination by the chivalrous French governor De Caen, with a complimentary letter to the governor of Madras."

At this time much difference of opinion was prevalent as to the relative advantages of the trigonometrical and astronomical modes of procedure, the former being the more accurate in its results, but by far the more costly of the two. Fortunately, Lambton was enabled to carry his point and to secure the adoption of the trigonometrical method. The wisdom of his choice was eventually made apparent, when it was found that the astronomical determination of the breadth of the peninsula in the latitude of Madras was no less than forty miles in error when tested by the greater accuracy of the triangulation.

The Survey having reached the northern boundary of Madras, it became necessary either to limit its action to that Presidency, or to transfer the work to the Supreme Government. The latter step was adopted, and under the title of the Grand Trigonometrical Survey of India, its further operations were carried on, still under the control of Lambton, who was indeed the only officer at the time in charge. The Governor-General before long perceived the danger of leaving so important an undertaking dependent on the life and health of a single individual, and he nominated as Lambton's assistants Captain Everest, of the Bengal Engineers, for geodetic operations, and Dr. Voysey, as surgeon and botanist.

Everest's first operation was very unpromising. Walker states :—

"He was deputed by Lambton to carry a triangulation from Hyderabad in the Nizam's territory eastward to the coast, crossing the forest-clad and fever-haunted basin of the Godavery, a region which he described as 'a dreadful wilderness, than which no part of the earth was more dreary, desolate and fatal.' Indignant at being taken there, his escort, a detachment of the Nizam's troops, mutinied, and soon afterwards he and his assistants, and almost all the men of his native establishment, were stricken down by a malignant fever. Many died on the spot, and the survivors had to be carried to Hyderabad, whence litters and vehicles of all descriptions, and the whole of the public elephants, were despatched to their succour. To recover his health Everest was compelled to leave India for a while, and proceed to the Cape of Good Hope, where he remained for three years. He availed himself of the opportunity to inspect Lacaille's meridional arc, which, when compared with the arcs north of the equator, indicated that the opposite hemispheres of the globe were seemingly of different ellipticities. He succeeded in tracing this anomaly to an error in the astronomical amplitude of the arc, which had been caused by the deflection of the plumb line at the ends of the arc, under the influence of the attraction of neighbouring mountains. Thus he became aware of the necessity of placing the astronomical stations of the Indian arcs at points where the plumb line would not be liable to serious deflection by the attraction of neighbouring mountain ranges."

On the death of Lambton, which occurred about this time, Everest was selected to fill his place. His first step on attaining to the post was to proceed to England, for the purpose of studying the improvements which had been effected in carrying on the various surveys of Europe, and at the same time to secure a supply of the newest and most scientific instruments. He returned to India in 1830, and at once began to place the survey of that country on a better footing, adopting all the modern methods and appliances, the advantages of which he had so clearly realized.

"He immediately introduced an important modification of the general design of the principal triangulation, which up to that time had taken the form of a network over the country on either side of the Great Arc, as in the English Survey, and many others. In its place he substituted the system of the French survey instead, and devised a series of meridional chains to be carried at intervals of about 1° apart, and tied together by longitudinal chains at intervals of about 5°, the whole forming what is called the gridiron, as distinguished from the network, system. The entire triangulation was to rest on base lines to be measured with the new Colby apparatus of compensation bars and microscopes, which had been constructed to supersede the measuring chain which the Emperor of China had rejected. Two radical improvements on all previous pro-

cedure were introduced in the measurement of the principal angles. The great theodolites were manipulated so as not merely to reduce the effects of accidental errors by numerous repetitions in the usual way, but absolutely to eliminate all periodic errors of graduation by systematic changes of the position of the azimuthal circle relatively to the telescope, in the course of the complete series of measures of every angle. The second improvement was the introduction of luminous signals for the cairns of stones which had previously been the marks for observation. There were lamps by night, and by day heliotropes, which were made to reflect the sun's rays through diaphragms of small aperture in pencils appearing like bright stars, and capable of penetrating a dense atmosphere through which distant opaque objects could not be seen."

The principal triangulation of India occupied a period of upwards of fifty years, from the date when Everest took charge of the work, being only brought to a conclusion in the year 1882. It had been all that time under the control of Engineer officers. Some of the difficulties encountered in the performance of the duty are thus recorded by Walker :—

"Many regions, as the basin of the Mahanaddi, the valley of Assam, the hill ranges of Tipperah, Chittagong, Arracan, and Burmah, and those to the east of Moulmein and Tenasserim, which form the boundary between the British and the Siamese territories, are covered with dense forest up to the summits of the peaks which had to be adopted as the sites of the survey stations. As a rule the peaks were far from the nearest habitation, and they could not be reached until pathways to them had been cut through forests tangled with dense undergrowth of tropical jungle ; not unfrequently large areas had to be cleared on the summits to open out the view of the surrounding country. Here the physical difficulties to be overcome were very considerable, and they were increased by the necessity that arose in almost every instance of importing labourers from a great distance to perform the necessary clearances. But the broad belt of the forest track, known as the Terai, which is situated in the plains at the feet of the Nepalese Himalayas, was the most formidable region of all, because the climate was very deadly for a great portion of the year, and more particularly during the season when the atmosphere was most favorable for the observations, though the physical difficulties were not so great as in the hill tracks just mentioned, and labour was more easily procurable. Lying on the British frontier, at the northern extremities of no less than ten of the meridional chains of triangles, it had necessarily to be operated in to some extent, and Everest wished to carry the several chains across it on to the outer Himalayan range, and then to connect them together by a longitudinal chain running along the range from east to west, completing the gridiron in this quarter. But the range was a portion of the Nepalese territories, and all Europeans excepting those attached to the British embassy at Khatruander were debarred from entering any part of Nepal by treaty with the British Government. Everest hoped that

the rulers of Nepal might make an exception in his favour for the prosecution of a scientific survey, and when he found they would not he urged the Government to compel them to give his surveyors access to at least their outlying hills; but he urged in vain, for the Government would not run the risk of embarking in a war with Nepal for purely scientific interests. Thus the connecting chain of triangles, now known as the North-East Longitudinal Series, had to be carried through the whole length of the Terai, a distance of about 500 miles, which involved the construction of over 100 towers, raised to a height of about thirty feet, to overlook the earth's curvature, and the clearance of about 2,000 miles of line through forest and jungle to render the towers mutually visible."

Everest retired from his office in 1843, and was succeeded by Waugh who, in his turn, was, in 1861, replaced by Walker, the author of the paper from which this sketch is taken.

The extent of the operations carried on in the principal triangulation of India may be realized from the fact that, without taking into consideration the primary network of Southern India, there still remains a series of chains, meridional, longitudinal and oblique, of a combined length of 17,300 miles, containing 9,230 primary angles. The work rests on eleven base lines, all measured with Colby's compensation bars.

The levelling for altitudes has had to be performed under great difficulties, owing to the variations in the temperature of the country. On this point Walker records :—

"In the plains the apparent height of a station ten to twelve miles from the observer has been found to be upwards of 100 feet greater in the cool of the night than in the heat of the day, the refraction being always positive when the lower atmospheric strata are chilled and laden with dew, and negative when they are rarified by the heat radiated from the surface of the ground. At hill stations the rays of light usually pass high above the surface of the ground, and the diurnal variations of refraction are comparatively immaterial, and very good results are obtained by the expedient of taking the vertical observations between reciprocating stations at the same hour of the day, and as near as possible at the time of minimum refraction; but in the plains this expedient does not usually suffice to give reliable results. The hill ranges of Central and those of Northern India are separated by a broad belt of plains which embraces the greater portion of Sind, the Punjab, Rajputana and the valley of the Ganges, and is crossed by a very large number of the principal chains of triangles, which are in most instances of considerable length. Thus it became necessary to run lines of spirit levels over the plains from sea to sea to check the trigonometrical heights. The opportunity was taken advantage of to correct all the levels which had been executed for irrigation and other public works, and reduce them to a common datum, and eventually lines of level were carried along the coast and from sea to sea to connect the tidal stations. The survey

datum, which has been adopted for all heights, whether deduced trigonometrically or by spirit-levelling, is the mean sea level as determined, either for initiation or verification, by tidal observations at several points on the coast lines."

The scale adopted for the topographical survey is one inch to a mile. There is also a Revenue survey of four inches to the mile, which shows areas and boundaries of villages. There are in addition to these large-scale surveys of various isolated districts in all the three presidencies.

Exclusive of the work performed in British India, several geographical surveys are being pushed forward in the various regions beyond the frontier, notably that recently executed by Major Holditch on the Russo-Afghan frontier.

The Grand Trigonometrical Survey of India has been the source of reputation to many Engineers. The names of Everest, Waugh, and Walker are as indissolubly connected with it, and rank as highly in public estimation, as do those of Watson, Roy, Colby, Portlock and others, who are the fathers of the Ordnance Survey of Great Britain and Ireland. Others have also become famous in the same school. Colonel D. G. Robinson may be quoted as one of such. He was first attached to the Indian Survey in 1850, and continued to serve on it until he was appointed Director-General of Telegraphs in that country. The following extract from an article upon him in the "Journal Télégraphique" shows the estimation in which his Survey work is held abroad :—

"En 1850 il fut nommé Officier du service topographique des Indes ou il conquit successivement ses différentes grades. Les travaux géodésiques qu'il executa dans ses nouvelles fonctions sont nombreux, importants, et se distinguent par leur extrême exactitude et le fini de leur exécution. . . . . Le Colonel Robinson était en effet un dessinateur topographique du premier mérite. Les cartes géographiques qu'il a dressées sont peut-être les plus beaux spécimens de ce genre de travail qui aient jamais été executées aux Indes, et elles seraient certainement distinguées dans tous les pays, même dans ceux où la géographie topographique a atteint sa plus grande perfection."

The Survey of India has had its martyrs as well as its heroes ; none, perhaps, more truly so than Captain Palladio Basevi. He obtained his commission in the Honourable East India Company's Engineers in 1851, and was attached to the Bengal Presidency. Having soon shown his pre-eminent fitness for the duty, he was placed on the Survey of India, and employed in the more scientific branches of that great work. In 1864 he was selected, at the request of the Royal Society, to undertake certain investigations for the determination of the force of gravity at the various stations

of the great meridional arc of triangles which extends from Cape Cormorin to the Himalayas. Fully impressed with the necessity of ensuring the utmost accuracy and precision humanly attainable, he devoted himself to the work with an almost superhuman energy. He carried on his observations of pendulum and clock coincidences for ten hours daily for a fortnight at each station, never leaving his pendulums for more than a few minutes at a time. His nights also were largely devoted to star observations. In order to obtain due corrections for temperature and pressure he frequently raised the air of the experimenting room some 50 degrees above its normal level, rendering it so stifling that of the many visitors who went to watch the observations, few could remain for more than five minutes at a time. No doubt the lengthened periods during which he breathed this trying atmosphere was the main cause of his death. In order to complete his investigations, he considered it advisable to swing his pendulums on some of the table-lands in the interior of the Himalayas, at an altitude of from 14,000 to 17,000 feet. For this purpose, early in 1871, he proceeded to Kashmir, and selected a spot called Moré, at an altitude of 15,500 feet, in latitude 33° 16′ and longitude 77° 54′, where he completed a most valuable series of observations. From thence he pushed on eastward, till he found another suitable spot at an altitude of over 16,000 feet, in latitude 34° 10′ and longitude 79° 25′. Here he was taken ill, far from all aid, and died July 17th, 1871, from the bursting of a blood-vessel in the lungs—a martyr to his zeal for the branch of his profession to which he had devoted himself.

CHAPTER III.

North American Boundary Commission.

Surveys in Palestine.

Extent of the North American Boundary Line—First Commission for the Atlantic portion in 1843—Astronomical Work—Severity of Climate—Mode of cutting Line -Defining Watershed—Second Commission for Pacific Side in 1858—Extended from Coast to Long. 114° W.—Difficulties encountered—Third Commission in 1872 to complete Line—Additional difficulties—Great Storm—System adopted in running the Line—Completion of Boundary across the Continent.

Palestine Surveys—Besant's opinion of the Engineers employed—Wilson and the Survey of Jerusalem—Extended operations in Palestine in 1865-6—Survey of Sinaitic Peninsula by Wilson—Conder's Survey of Western Palestine in 1872—Conder joined by Kitchener—Eastern Palestine work in 1881.

The North American Boundary.

The Delimitation of the Boundary between the British possessions in North America and those of the United States, has been an operation most interesting, not only on account of the vast political issues involved, but also owing to the great physical difficulties under which it was carried out.

So large an extent of the boundary had been decided by treaty to run either along parallels of latitude, or else due north or south, that the lines could only be fixed after the most elaborate and careful astronomical observations. In a great number of instances these observations had to be carried on during the severity of almost Arctic winters. It is difficult to overrate the physical strain upon the nerves and constitution involved in this class of work, with the thermometer standing from 30° to 50° below freezing-point. As a matter of fact the instruments used broke down under the trial, far more than did the officers engaged; and the accounts given of the operation show the extent of the trial endured by all.

The whole line involved stretches from 63° to 125°, west longitude, a large portion of which passed through country almost inaccessible, either from physical conformation or from its desert character. The work has been done by slow degrees, spreading over a large number of years, and involving the appointment of three several Commissions. The general question of the boundary had been more or less rightly defined by the

treaty of 1873, and at that time it was not contemplated that, as regarded a great portion of the distance, it could ever become necessary to lay down an actual line throughout its extent.

In the year 1794, the portion which lay to the east of 68° West Longitude was ratified by a fresh treaty, and a monument erected at the source of the river St. Croix to mark its western termination.

Under the treaty of Ghent in 1814, it was decreed that this demarcation should be extended westward as far as the river St. Lawrence. To effect this, one line was to be run due north from the St. Croix to the river St. John, and another eastward on the 45th parallel of latitude from the St. Lawrence to Hall's Stream. The portion between Hall's Stream and the Great Falls on the St. John river (which was the point where the north line terminated) was still left only roughly identified, partly by river and partly by high ground. Of the two lines to be thus defined, that from the St. Croix to the Great Falls was run by Colonel Bouchette and Mr. Johnson in 1817-18. The other on the 45th parallel was cut by Messrs. Valentine and Collins. In doing this they followed a series of blazes which had been marked out as far back as the year 1772. This was extremely inaccurate and crooked, only approximating the true line of parallel.

As regards the North line, it seems from evidence afterwards obtained, that Colonel Bouchette and Mr. Johnson had started from the monument at the source of the St. Croix, and, working their way north by compass, had blazed the route on the trees as they went. A party of assistants and axe-men followed them, who received instructions to lay down with greater accuracy the true north line, and to cut it to a width of sixteen feet. These orders were obeyed, but by the time the cutting had been carried on for something short of twenty miles, the party found that they were deviating so much from the blazed line traced by their principals, that they were afraid to continue the work—and left the woods without proceeding farther. No more steps appear to have been taken, and the line was left in this imperfect state—a matter which at the time was considered as quite unimportant, since it passed through a densely wooded country which it seemed unlikely would ever be cleared.

Matters remained in this state, until, as time went on and lands were more and more taken up, it became evident that an accurate boundary must be laid down. This was done by the Treaty of Washington in 1842, which thus defined it :—

"Beginning at the monument at the source of the river St. Croix, thence north, following the exploring line run, and marked by the surveyors of the two governments in the years 1817 and 1818, to

its intersection with the river St. John, thence up the middle of the main channel of the said river to the mouth of the river St. Francis, thence up the middle of the channel of the said river St. Francis and of the lakes through which it flows, to the outlet of the lake Pohenagamook, thence south-westerly in a straight line to a point on the north-west branch of the river St. John, which point shall be two miles distant from the main branch of the St. John in a straight line and in the nearest direction. . . . Thence in a straight line in a course about south 8° west to the point where the parallel of latitude of 46° 25′ north intersects the south-west branch of the St. John, thence southerly by the said branch to the source thereof, in the highlands of the Metjarmetto Portage, thence down along the said highlands which divide the waters which empty themselves into the river St. Lawrence from those which fall into the Atlantic Ocean, to the head of Hall's Stream, thence down the middle of said stream till the line thus run intersects the old line of boundary surveyed and marked by Valentine and Collins previously to the year 1774 as the 45th degree of North Latitude, . . . and thence along the said line to the St. Lawrence river."

A careful reading of the above will show that the boundary so defined is made up of a series of lines connecting rivers, and that with one exception these lines are straight. The exception is that of the highlands, which were to be traced by the watershed, a matter of some complication and liable to cause dispute. This, however, fortunately did not arise.

To carry into effect the delimitation of this boundary, both of the contracting Powers appointed Commissions to work together for the purpose. The British party was composed of a Commissioner (Lieutenant-Colonel Bucknall Estcourt), a secretary, two astronomers (Major W. Robinson, R.E., and Captain J. H. Pipou, R.E.), two surveyors (of whom one was Captain Broughton, R.E.), and six, afterwards increased to twenty, Non-commissioned Officers of the Royal Sappers and Miners, taken from those engaged on the Ordnance Survey. Work was begun in June 1843, Fredericton in New Brunswick being made for a time the British Head-quarters, which were afterwards transferred to the Great Falls on the River St. John.

The most important branch of the work was that which fell to the lot of the two astronomers, who were to determine the latitudes and longitudes of as many points along the boundary line as might be necessary to enable the surveyors to adjust their surveys, and produce a correct map, any triangulation along the boundary line being impracticable. It was also necessary further to determine the precise direction of the two straight lines, the first between the outlet of Lake Pohenagamook to the north-west branch of the

river St. John, and the other from that point to the south-west branch. Owing to the impracticable nature of the country, these lines could only be run by ascertaining very accurately the latitudes and differences of longitude of the extreme points, and then calculating their bearings with the meridian.

The plan of operations adopted was taking up astronomical stations at short distances apart, between which communication could be made within two or three days. The difference of longitude between each of these stations was determined by the interchange of pocket chronometers, and in some cases by signals. The latitude was ascertained by observations of the altitudes of stars when on or near the meridian. These stations commenced at the Great Falls, and were carried round the boundary until the outlet of Lake Pohenagamook was reached. Then the point on the north-west branch of the St. John, as defined in the treaty, was fixed, and, with the assistance of an intermediate station, the necessary observations were made to determine the precise direction of the straight line to be cut, which was sixty-four miles in length. This work was carried on all through the winter, so that the cutting parties might begin in the spring. Up to the end of October no difficulties arose beyond those incident to work in such a wild part of the country; but then the cold weather set in, which, during the months of November, December, and January, became intense, and interfered greatly with the observations. The thermometers that had been supplied to the Commission from Greenwich, were only graduated to register as low as 19° below zero of Fahrenheit. These became useless, as the mercury shrank into the bulb. It was supposed that the temperature must in reality have sunk to at least 30° below zero. The chronometers were kept in a deal box packed round with horse hair, the box itself being wrapped up in blankets to keep the temperature as even as possible. In the day-time the hut was kept up to 60° by the stove, but during the night the fire could not always be prevented going out, and then the great and sudden change affected them sensibly. In the report of the proceedings of the astronomers, the action of each of these chronometers is fully dilated on. One is stated to go well if kept warm, but if taken into the observatory it would stop directly. Another misbehaved itself by stopping once at the winding up for 1′ 16·5″, "which it had never done before." This, however, was purely owing to the cold, as "both before and after these months this chronometer performed very well." On one night in November these pocket chronometers stopped from the intense cold.

The observations having been persistently carried on through the winter, it was arranged to begin cutting the line on March 1st,

1844. Two parties started for this purpose, one cutting southwards from the lake, and the other northwards from the river. The mode of work was as follows. An elevated spot was selected in the proposed line, and the transit instrument erected there. As soon as it was dark a light was burnt at the starting point, and the instrument set upon it. Being then turned on its axis, the true direction of the line in continuation was easily and accurately ascertained. A party was then sent forward to the next ridge. The plan of getting into line was thus arranged: A torch made of the bark of the birch tree, which gave a very brilliant flame, was lighted. This was visible at a great distance, and the party at the transit instrument were able to see how far the torch was from the right line. Signals were then made by flashing gunpowder. One flash, "Move more to the right;" two flashes, "Move more to the left;" three flashes, "Halt;" and four flashes, "All right."

It was not until the end of five weeks, during which time the two cutting parties had been gradually approaching, that they came within sight of each other. Then one day the party advancing northwards discovered an apparent gap in the outline of the tops of the trees in front. This was seen by a man who had climbed one of them for the purpose of looking out. Shortly afterwards trees were seen falling on the ridge towards which they were advancing, and all doubts were at an end. Each party kept working onward till they were abreast, when it was found that the deviation of the two lines was 341 feet, an amount in a length of sixty-four miles equal to what would be produced by about one quarter-second of time error in the determination of the difference of longitude of the two extremities of the line.

One more point is worthy of mention, and that is the method adopted for marking the boundary along the watershed in what were termed the highlands in the Treaty. Lines were run across the ridge, leaving the source of water flowing westward into the St. Lawrence, and continued until meeting the source of water flowing eastward. The highest points on such lines were taken as the dividing ridge. In order to connect these summit-points, the practice pursued was to send a man to blow a horn at one summit, which being heard at the next, afforded a guide to a party which, following the highest ground around them through all its windings, inclined in the direction of the horn whenever the ground admitted of their doing so, and thus they blazed the line from one point to the other.

The work done by the British Commission in cutting the boundary line, which was of the width of 30 feet, in the season of 1844, was no less than 224 miles, the American party having only cut 40 miles during the same time. This disparity of work had been

agreed upon between the Commissioners, as the Americans undertook to cut the remainder of the line on the 45° of latitude to the St. Lawrence later on without assistance. The boundary having been thus fixed up to the point where the 45° of latitude struck the St. Lawrence, the line westwards needed no further delimitation. From that point it ran through the river to the great lakes, until at Lake Superior it followed the course of Rainy River, and so into the Lake of the Woods, at the north-west angle of which a boundary mark had been placed in 1826, in a region far beyond what at that time was considered likely to require more accurate definition than was contained in the words of the treaty.

Matters remained in this condition until the year 1858. By this time the territory on both sides of the 49th parallel of latitude had become more or less taken up on the Pacific coast, and the boundary question on that side of the continent had assumed an urgent character. It was, therefore, determined that an accurate marking out of the line should be carried through on this side by a joint Commission, as had been already done in 1843-4-5 on the Atlantic side. For this purpose Colonel Hawkins, R.E., was nominated Commissioner on the British side, and Mr. Campbell on the part of the United States. Lieutenant C. W. Wilson, R.E., acted as secretary to the British Commission; Lieutenant Darrah, R.E., was one of the two astronomers, and Lieutenant S. Anderson, R.E., surveyor.

A party of fifty-six Non-commissioned Officers and Sappers of the Royal Engineers was also selected to be attached to the Commission, and to assist in carrying out the survey operations.

On August 13th, 1858, the two Commissioners met officially for the first time. They decided to commence the work from the point on the eastern shore of the Gulf of Georgia where the 49th parallel strikes the water, and to carry it to the Cascade Mountains. The water point had already been fixed by Captain Prevost, R.N., Her Majesty's Commissioner for the water boundary. As this section of country was very heavily timbered, the Commissioners considered at first that it would suffice to ascertain points on the line ten or twelve miles apart, and to mark such points by cutting a track some twenty feet wide for a distance of half a mile on either side. After the first operations had been completed, it was thought by the British Commissioner that the boundary should be more effectually marked, and at a meeting of the joint Commission held in April, 1859, he proposed that the cutting of twenty feet wide should be continuous, and the parallel marked by suitable monuments at intervals of about a mile. The United States Commissioner would not agree to this, or

allow his party to take any share in the work, which therefore fell entirely upon the British.

The starting point was marked by a granite obelisk formed of blocks weighing over two tons each, and the line from thence to Roche river, a distance of 105 miles, was defined by iron pillars placed at intervals of about three-quarters of a mile. Each pillar was fixed on a cedar stump, charred and sunk to a depth of four feet into the ground. The space around the pillar, for a radius of twenty feet, was ploughed up, and cleared of all roots.

In order to compare the results obtained in the field, observations for latitude were made by the British Commission during the winter of 1860-61 at the United States Observatory at Colville, when there was found to be a discrepancy of only fifteen feet between the two latitudes. The mean parallel of 7 1 miles, which was laid down by the American party, was marked by a series of fifty-eight stone pyramids.

Some idea of the difficulties encountered in the work may be formed by a glance at the following description, given by Wilson, of the nature of the country :—

"From Semiahmoo to Sumass the country is low, in many places very swampy, and covered with perhaps the densest forest that can be seen anywhere, for not only are many of the trees of enormous girth, from 25 to 35 feet in circumference, but the spaces between them are filled with an almost impenetrable mass of underbrush and fallen timber. Little variation is to be found in the vegetation, the large trees being all fir or cedar. At Sumass and the mouth of the Chilukweyuk there is a good deal of fine prairie land, but it is subject to an annual overflow during the June freshet, and the whole of this part of the country is so infested with mosquitoes, from the middle of June to the middle of September, that even the Indians cannot stand it, and move to some other part of the country for these three months. Between Sumass and Schweltza the Cascade mountains commence, and from this point to the Shimilkameen, 110 miles on, the country is of the most rugged description, and it was only by taking advantage of the valleys and mountain glens running in a north and south direction that the parallel could be reached, the intervening ground being impracticable, and sometimes rising above the snow line."

A cutting party consisted of 1 Non-commissioned Officer and 15 civilian axemen, the Sappers proving far inferior to civilians in that particular work. Three-eighths of a mile was considered a fair day's work. An astronomical party consisted of 1 Officer, 7 Non-commissioned Officers and Sappers, and 13 civilians. A survey party consisted of 1 Officer, 1 Non-commissioned Officer, and 4 Sappers with 4 civilians.

"In thickly wooded country," says Wilson, "when even by clearing

away branches, lines could seldom be much longer than 150 links, the rate of progress was about three miles a day. A spare chain was always kept, with which the working chain was compared every morning; and a small whetstone and magnifying glass were carried to sharpen the point of the pivot of the compass when it became blunted. The survey always starting from one point on the parallel and closing on another, it followed that the resolved parts in a northerly direction ought to be equal to the resolved parts in a southerly direction, and in a survey of thirty or forty miles this was always found to be the case within a few chains, which were apportioned back throughout. Every evening observations were taken with a five-inch theodolite for variation of the compass by azimuths on Polaris, and observations for latitude with the sextant were made at intervals to act as a check on the survey."

"The supplies were drawn from Victoria and Langley, and conveyed to the principal depôts by the river steamboats, and from these distributed again by canoes, bateaux, boats, scows, Indians and the pack train. The canoes were those of the country; made of wood and manned by Indians, they were very useful in shallow and swift water, but were more used for travelling than conveyance of stores. The bateaux were of the Hudson's Bay Company's pattern, and were large flat-bottomed boats, sharp at both ends; they were used in crossing the Sumass Lake and on the Fraser River, where the extravagant prices of a gold country frequently made this the cheapest mode of transport."

"During 1859 the pack train consisted of fifty-five mules and forty-four horses. These were hardly sufficient for the work of the Commission, but no more could be obtained at the time, and some little nicety had to be observed in their employment. Whilst working in the mountain district the greatest care had to be taken to prevent superfluous weight going up the trail. The whole strength of the Commission, nearly 100, was scattered over the country in no less than seven different parties, and from Chilukweyuk to Roche River there was not a blade of grass, so that forage for the animals had to be carried, as well as the stores and provisions. From the depôt to Roche River and back was thirteen or fourteen days' journey, and as each pack-mule ate from ten to twelve pounds of corn per diem, or about 150 pounds during the journey, without counting the riding animals, it will be seen that some little management was necessary to keep everyone supplied with provisions. In the Chilukweyuk Valley the means of transport was seriously diminished by a curious disease very prevalent among the mules, their heads suddenly swelling to an enormous size. This was generally cured by the application of a seton."

"The trails used were mere bridle-paths leading from the depôts to the stations by the nearest practicable route, just room enough being allowed for a mule with his pack to pass through the timber. A Non-commissioned Officer was placed in charge of each trail party, and his duty was to reconnoitre ahead and blaze the best route by cutting an occasional chip out of the trees to the right and left, keeping the general direction with a compass, which was very necessary in a heavily-timbered country,

where one could seldom see more than ten yards ahead. The process of bridging occupied much time and labour, and there was a great deal of it. On the trail from Langley to the parallel above there was as much as 4,500 feet. A party of five men would do about 100 feet of rough bridging in a day, two to saw and split, two to lay down, and one to carry."

"Little dependence could be placed on the resources of the country for provisioning, and the mainstay was pork and bacon. Grouse, ducks, and geese were obtained in considerable numbers at certain seasons, and occasionally deer. In summer and autumn there was an abundance of various kinds of berries, which were very useful as anti-scorbutics. In August, September, and October, salmon run up the rivers in such quantities, that after spawning both air and water are tainted by the dead fish floating down and lodging on the banks; these during the season give a good supply of fresh food, but it is one that palls on the appetite, and salt pork and bacon are soon returned to with relish."

"The sappers when in the field behaved admirably, entered into the spirit of the affair, and never shirked hard work; and even in winter quarters there was little fault to be found with their general behaviour, considering the extraordinary temptations by which they were surrounded. Indeed, there may be almost some excuse for men who, removed during the greater part of the year from all vestige of civilization, suddenly came down to a settlement, with their pockets full of money, and were always on these occasions surrounded by a crowd of Americans eager to treat the 'Britishers' to a drink."

Considering the exposure the men had undergone, working in all kinds of weather, and throughout the winters of 1859-60 and 1861-2, there was very little sickness; three Sappers died, and three were invalided. The deaths, however, were not in any way chargeable to the boundary work

The line run under the auspices of this Commission, stretched from the Pacific coast to the Rocky Mountains, terminating in longitude 114° west. There remained, therefore, the space between this point and the Lake of the Woods, in longitude 95° west, still undefined, and it was not until the year 1872 that it was considered advisable to mark the line between these two points. Even then the country through which it would pass was almost unknown. It was believed to be all prairie land, or bare plain, with the exception of the swampy district between the Lake of the Woods and the Red River. West of the 100th meridian was supposed to lie the great American desert, beyond which were the "bad lands" of the Missouri, and still farther on were the hunting grounds of the Blackfoot and Blood Indians, who were reported to be unfavourably disposed to intruders on their districts. It was, therefore, anticipated that in addition to the difficulties to be encountered from the natural obstacles of the country to be traversed, there would probably be

danger from the hostility of the Indians. Such, however, did not prove to be the case. On the contrary, when they were met with, they seemed very friendly. Captain Featherstonhaugh says :—

"These people were well clothed and armed, and appeared to have plenty of food ; they always begged for a small quantity of tea, sugar, and flour, and were particularly keen after matches, which they evidently valued highly. They asked numerous questions about the objects of the expedition, and appeared relieved to hear that no idea of a railway lay at the bottom of it. As far as could be known, the fact of a boundary being marked between the British and American territories seemed to be welcome to them, and it is said that they were rather disappointed that a wall or continuous bank was not set up across the plains, a thing which they had been led to expect."

The Engineer portion of the Commission was composed as follows :—Captain Ward, Secretary to the Commission ; Captain Anderson, Chief Astronomer ; Captain Featherstonhaugh and Lieutenant Galway, astronomers, to whom was added in the following year, Lieutenant Rowe ; also forty-four Non-commissioned Officers and Sappers.

The officers and men with their instruments and equipment reached Quebec at the end of August, 1872, from which point they pushed on through the great lakes, and thence by railway till they came to the Red River. They then travelled by steamer northwards till they arrived at the frontier on the 49th parallel at Pembina. Here they went under canvas in the immediate vicinity of the United States party, who had encamped there some days before.

The following plan of operations for the autumn and winter was agreed upon between the two Commissions. The position of the north-west angle of the Lake of the Woods, as marked in 1826, was first to be identified, and the survey of the shore line made ; the meridian line was then to be traced south until the 49th parallel was reached, after which, as many points as possible between the Lake and the Red River were to be established, working in both directions. The first difficulty encountered was the discovery of the monument by which the north-west angle had been marked in 1826. Observations were taken and calculations made which should have led to its discovery, as its bearings had been laid down when it was first established. After three days' fruitless search, some Indians appeared, who said they could point out the site. The spot they indicated was covered with water to a depth of about eighteen inches, and here, on search, the remains of a large square crib of logs was found. This was taken to be the foundation of the reference monument, and from it the north-west point was

determined, as specified in the Treaty of Ghent. Observations for latitude were then taken by Captain Anderson, and meanwhile, a line was cut due south through the woods to reach the 49th parallel. A number of Chippewa Indians, who were encamped on the spot, were engaged as axe-men; but the utmost difficulty was encountered in getting them to work with anything like steadiness. They would start with the most praiseworthy vigour in the morning, but in a short time would knock off work, light a fire, and commence to smoke. Then if they were got to work again they would suddenly stop once more and proceed in search of Captain Anderson, demanding more pay and more food. After about a fortnight they had nearly all broken down from want of strength. They were miserably clad, and the working in the icy water of the still unfrozen swamps was terribly severe on them. Eventually they subsided into becoming carriers of loads as the camp moved southwards, and in that capacity proved most useful. The length of this cutting, before the 49th parallel was reached, was a little over sixteen miles, the ground being very swampy the whole way.

The line having been reached, work was commenced along it from Pembina eastwards and from the Lake westwards.

Some idea of the severity of the work may be gathered from the following extracts of Captain Featherstonhaugh's account :—

"After completing the observations for latitude, Capt. Featherstonhaugh set his men to cut east and west tangent lines (*i.e.*, straight lines tangent to the parallel) through the woods, the intention being to cut about ten miles to the east, and then to work westward as far as Pointe d'Orme. It was soon found, however, that the muskegs, or swamps, which lay to the east were so continuous that progress during the open season would be very slow indeed, and it was resolved to work only westward, in which direction the trees were much larger, and there was some sort of foothold to be obtained. These muskegs are four or five feet deep in many places; they have on the surface a skin of sod, which scarcely supports the weight of a man, and when it is pierced the muddy water rises in the hole nearly to the top. A person breaking through goes down to his middle, and has some trouble in getting out again. The westerly line being continued, considerable difficulties were shortly experienced in the work, the frost which set in on the 10th Nov. having been unfortunately preceded by snow, which for some time prevented the ground from freezing. The men were unskilled in the use of the axe, and the swamp holes between the trees, which it was impossible to avoid, kept them constantly half-wet through. This, with the thermometer at zero or but a little above it, could not fail to be a serious thing; and besides the direct suffering from the cold, many were attacked with diarrhœa, one man being dangerously ill with congestion of the liver. Anxiety was always felt also as to the safety of the supply teams, which had to traverse 100 miles of open

country, where a snow storm might prove dangerous. The cutting was, however, continued, and after about 4½ miles had been completed through the spruce and tamarac, the party, to their great satisfaction, emerged on to the open surface of the great Roseau swamp. This was then just frozen over, and as far as the eye could reach the glare ice stretched away to the horizon towards the south and south-west, with small tufts of grass here and there, and thin wreaths of snow curling up before the wind that swept across it. Desolate as the aspect was, the change was welcomed from the wet and fatiguing work in the woods, and the line was quickly taken across the open. A day or two of the great cold now set in, giving the finishing touch to the swamps and rivers, and causing the party to wish for the shelter of the woods again. On days like this, when protected from the wind, anyone will get along tolerably well, though the thermometer be 20° or 30° below zero; but the slightest breeze produces great discomfort, and it is very difficult to pay the proper attention to surveying operations. On several occasions the eyelids would feel as if they were about to be frozen down, the ends of the lashes becoming tipped with ice; the first realization of this produces unbounded surprise to the person concerned."

Then comes an account of the great storm of the 7th, 8th, and 9th January, 1878. Captain Anderson, who was travelling with a dog train near Lake Roseau was met by this terrible wintry blast:—

"For three days, with the thermometer at 20° below zero, the wind blew with extraordinary force, raising mists of fine snow from the surface, so that the air became of a milky opacity, and objects were invisible at a few yards' distance. In Minnesota eighty persons were frozen to death, and a coach load of passengers, as well as the horses, suffered the same fate. Capt. Anderson, and those with him took refuge in one of the small islands of poplar, near the shores of the lake, and being able to keep a fire alight, escaped without harm. The parties at work on the prairie fortunately took the alarm in time, and got back to their camps; but two men—one of them a sapper—who were driving in a wagon a few miles from North Pembina, were obliged to come to a halt, cut the horses loose, and remain wrapped in their buffalo robes for two days and nights inside the wagon without food or fire."

The system adopted in running the line of boundary was to determine the latitude by astronomical observations at intervals of about twenty miles along the parallel. The connection between the stations was made by laying off a line from one of them at right angles to the meridian, and prolonging this line until it struck the meridian of the other, the whole distance being chained and marked with pickets; the proper offsets to the parallel were then measured at all the points where permanent marks were to be set up. These were placed at intervals of one mile between the

meridians of 96° and 99°, which include the province of Manitoba, and at intervals of three miles westward of 99°.

The nature of the country through which the line was to be run, practically uninhabited and unknown, rendered it necessary that the parties should as far as possible be assisted by exploration in advance, so as to avoid the loss of time which must have accrued, had they been called on to search for themselves, or to take preliminary observations before setting up the zenith telescope as near as possible to the line. It was also necessary that depôts of provisions should be established at the proper intervals. Any mismanagement on these points would have led to delay, involving great extra expense. A reconnaissance party of twenty scouts was therefore formed, and Captain Anderson pushed ahead with them, making a sketch of the country as he travelled, and keeping his course by sextant observations for latitude and time. With the aid of a pocket chronometer he was able to obtain the longitude of particular points with sufficient accuracy to mark out the sites of the astronomical stations, as well as to select and map down the positions of the depôts where water could be procured.

We have already seen how the winter survey was carried out under difficulties and exposure such as rendered the work extremely hazardous. The summer, which was naturally the time when most progress could be made, brought with it its own evils. Captain Featherstonhaugh in his report says :—

"Grass, fuel, and water were abundant, but the plague of flies was almost intolerable; the horses, which could not feed properly, suffered considerably in condition, and all hands had to wear mosquito veils and gauntlets. The number of mosquitoes in the summer in these countries is quite incredible, and the reality is worse than the anticipation. It may suffice to say that oxen have been known to be choked by them, and that on a still warm night the noise they make beating on the outside of a tent resembles that of rain."

It has been said that in the wilder parts the line was marked by mounds three miles apart. In describing the work at Turtle mountain, where the cutting reached a considerable elevation, Featherstonhaugh says :—

"The mounds marking the 49th parallel on the prairie to the eastward could be seen stretching in a gentle but well-defined curve, thus giving the spectator a very graphic idea of the size and figure of the earth."

The work was carried gradually west, until the Rocky Mountains were reached, where the terminal monument of the Pacific portion of the boundary had been fixed in 1861. The closing-in is thus described by Featherstonhaugh :—

"Following the Indian trail up the Kootenay Pass, Captain Anderson, with Mr. Dawson the geologist, and the reconnaissance party, crossed the

watershed into British Colombia, and coming upon the old trail of the Boundary Commission of 1861, followed it to the terminal monument, which is situated on a very curious saddle-back with precipitous sides, the mountain tops to the north and south rising straight up from it. Owing to its sheltered position the monument was in perfect preservation, and a survey was carried back from it to the point where the Kootenay Pass trail crossed the watershed. Mr. Ashe's party, bringing their traverse up the pass from the plains reached this point on the 27th of August (1874), and the connection between the work of the two Commissions was complete."

The work was now practically finished, the boundary line was marked from ocean to ocean, and it only remained to fix the delimiting pillars at the proper intervals, which was done during that autumn and the following year. The British parties assembled together at the rendezvous at Woody Mountain on September 19th, and began their long march eastward to Pembina. They numbered 167 officers and men, with 200 horses and 100 carts, and after a prosperous march, arrived at Pembina on October 11th, 1874. From the Rocky Mountains to this point, the distance was 860 miles, and this had been accomplished in forty-three days.

The Survey of Palestine.

The Surveys of the Holy Land are too important, and have shed too much lustre on the names of the Engineers engaged in them, to be passed over in silence. Besant in his book on the subject, "Twenty-one years' work in the Holy Land," says :—

"At the outset of this record it is the special duty of the Committee" (*i.e.*, of the Palestine Exploration Fund), "to express, firstly, their profound gratitude to the War Office for granting the services of Royal Engineers for the execution of the work ; and secondly, their sense of the surprising good fortune which has attended them in the personal character and the remarkable abilities of the officers who have worked for them. Among the many distinguished officers who at present adorn the scientific branch of the Service there are none more distinguished than Sir Charles Wilson and Sir Charles Warren. There was no officer of the Corps more highly esteemed than the late Major Anderson. As for Capt. Conder, he will be regarded as nothing short of a personal friend by every one who reads these pages. He has been for fifteen long years the chief prop and mainstay of the Society ; he is *par excellence* the Surveyor of the Holy Land. The military record of Lieut.-Col. Kitchener promises to eclipse his civil distinction. But it must never be forgotten that before he went to Egypt he surveyed Galilee for the Society."

The first step in the work was the Survey of Jerusalem. The

difficulties attending this operation cannot be better described than in the modest words of Sir Charles Wilson himself:—

"The Survey of Jerusalem originated in Miss (now Baroness) Burdett Coutts' wish to provide the City with a better water supply. She was told it was first necessary to make an accurate survey of the City, and for this purpose she placed £500 in the hands of a Committee, of whom Dean Stanley was one. He applied to the S. S. of War, who placed the matter in Sir H. James's hands. The conditions were that £500 was to cover all expenses, including the passage out and home of the surveyors, and the preparation of the fair plans. An Officer was to go, but he was to pay all his own expenses, and receive no extra pay whilst employed. The appointment was offered to several R.E. officers; but the conditions were so hard, and the possibility of doing the work within the estimate considered to be so remote, that they all refused. I happened to be in the room of one of the Officers when he received the letter offering him the appointment; he said he would not go, and I then asked him, in writing his report, to say that I would go. I had only once seen Sir H. James before, and was therefore a little surprised when he accepted my offer. I was generally considered to be going on a fool's errand; many believed I would come to grief in money matters; and even men who had had previous experience in Palestine and Jerusalem told me they did not believe the Turkish officials would allow me to survey the city. The only man who gave me any encouragement, and said he thought I had done right, was the late General H. D. Scott, R.E. I went out; surveyed not only the city, but the Mosques and Sacred Area, and only exceeded the estimate by a few pounds, the excess being due to our being jammed in Egypt during the cholera epidemic of 1865. The levelling operations from the Dead Sea to the Mediterranean were partly carried out in June, owing to the lateness of the notice we got to do it. The exact difference of level between Solomon's Porch and Jerusalem was also determined for the Syrian Improvement Committee. I also made some experimental excavations to find the approximate depth of the rubbish, and to show that excavations could be made without arousing the fanaticism of the Moslems. By the time we left Jerusalem the R.E.'s were looked upon as people who were allowed to go anywhere or do anything, and they were considered to be the friends of everyone. This was greatly due to the exceptionally good conduct of the men, and the good management of the late Serjeant James McDonald, afterwards Quarter-Master at Southampton. The party consisted of him and Lance-Corporals Francis Ferris and John McKeith, Sappers John Davidson and Thomas Wishart."

The prospectus issued by the Committee, which was drawn up by Professor Owen, contains the following extract on the subject of the Survey. It is dated in October, 1865:—

"The survey of Jerusalem at present in progress under the direction

of Captain Wilson, R.E. (a survey supported by the private liberality of a single person, as it proved, the grant of £500 made by the generous person referred to, was unequal to the work, which was only accomplished by the generosity of Captain Wilson, who gave his whole time and labour for nothing), has shewn how much may be done with tact, temper, and opportunity, without arousing the opposition of the authorities or inhabitants. Recent letters of Sir H. James and others in the 'Times' have borne testimony to the remarkable fitness of Captain Wilson for such undertakings."

Wilson had no sooner returned from this work than he undertook charge of a fresh expedition, organized under the auspices of the Palestine Exploration Committee. Accompanied by Lieutenant Anderson, R.E., he started for Syria in November, 1865, and remained in the field until May, 1866. The objects of this expedition were first to fix spots for further investigation, and secondly to collect whatever information might be possible to throw light on the subject of biblical research. The following were the principal results obtained: By accurate observations for time and latitude, made at forty-nine separate points between Beyrout and Hebron, and by a line of azimuths carried through the country from Banias to Jerusalem, a series of detailed maps was formed, on a scale of one inch to a mile, of the whole backbone of the country from north to south, including the lake of Genesareth and all the watercourses descending to its western shores. Materials were collected for making about fifty detailed drawings of churches, synagogues, mosques, temples, tombs, &c., amongst which are the plans of the cities of Beizan, Sebastiyeh, and Cæsarea, of the Holy Place of the Samaritans and the ruined Church of Justinian on the summit of Mount Gerizim, of ancient churches at Baalbek, Yarun, Sebastiyeh, Beitin, Bereh, Cæsarea, Lydda, Beit, Jibrin, Kuryet-el-Enab, and Jerusalem, of seven Jewish synagogues, of the Grand Mosque at Damascus, of a Mosque at Nablu, of Temples at Deir-el-Kalah, Mejdeb-Anjur and Kedes, and of numerous tombs in various parts of the country. A series of 166 photographs was also taken, comprising views of sites, details of architecture, inscriptions, and some of the more important and curious natural objects.

"On Mount Gerizim numerous excavations were made under the direction of Lieutenant Anderson. Within the ruin known as the 'Castle,' the foundations of an octagonal church were laid bare, probably the one known to have been built there by Justinian.... The church and castle were found to be built on a rough platform of large stones, laid together without mortar, and of this—which may possibly be that on which the Samaritan Temple stood—the so-called 'twelve stones' form a portion."—(Besant.)

In the year 1870 Wilson undertook the survey of the Sinaitic peninsula. This was carried out by public subscription. At first support was but charily given, and the project was sadly hanging fire, when Wilson once more came forward and volunteered to carry out the design on the same onerous conditions as those with which the Jerusalem survey had been saddled. This offer, when made known by the Press, brought in a considerable amount of additional pecuniary support, and in the end it was found, when the work was completed, that a sufficient balance remained to afford a remuneration, though scarcely an adequate one, for his services in the matter.

The party consisted of Captains Wilson and Palmer, R.E.; Mr. E. H. Palmer, the skilled Arabic scholar; Mr. Wyatt, as naturalist; the Rev. N. W. Holland and four Non-commissioned Officers of the Royal Engineers, selected from the staff of the Ordnance Survey, one of them, Serjeant-Major MacDonald being an experienced photographer. They started from Suez on November 11th, 1868, and made their way to Jebel Mûsa, where they established a depôt for their stores at the convent of St. Catherine, which is situated at the foot of the mountain. This point was reached after a march of ten days. Here a special survey of the mountain and the surrounding district was made, a base being chosen in the plain of Er Râhah. Every prominent peak was scaled, with no little risk to limbs and instruments, and their relative positions and altitudes were determined.

Towards Christmas it became so cold, and snowstorms so constantly interfered with the work, that the camp was moved for a time to lower ground, and the survey of Jebel Serbal and its northern valleys commenced. This portion was of about the same extent as that of Jebel Mûsa, and when completed was extended to the surrounding districts. On the weather becoming milder the camp returned to its first site, and the survey was completed before the end of April.

Many points seem to have been definitely cleared up by the investigations of this party. Mount Sinai was proved to be Jebel Mûsa, which alone of the mountains in the peninsula answers all the requirements of the description in Exodus. The head of the Gulf of Suez was considered to be the spot where the passage of the Red Sea was effected, and the route of the children of Israel from that point to the Mount was traced with every condition of probability.

In 1872 the survey of Western Palestine was begun. The first officer placed in charge was Captain Stewart, R.E. He was, however, obliged almost immediately to resign owing to ill health, and the party, consisting of Serjeant Black and Corporal Armstrong,

both picked men from the Survey Companies of the Royal Engineers, with their assistants, were placed under the temporary charge of Mr. Tyrwhitt Drake, who was attached to the expedition as archæologist and linguist. For six months these Non-commissioned Officers worked steadily without the superintendence of any officer, and carried the survey over a narrow strip from Jaffa to Jerusalem, and thence along the watershed as far north as Nablus, a distance of thirty miles from the capital, completing in the first half of 1872 about 500 square miles. As regards this most creditable performance Lieutenant Conder wrote:—

"This work has since, under my direction, been re-examined, and the excellent character of this part of the map reflects the highest credit on the zeal and care of the two surveyors, who, though ignorant of the language and unaccustomed to the style of work required, yet succeeded in recovering everything of value in the district."

Conder joined the party and took charge of the work towards the end of July, and pushed the survey forward through Samaria. In his "Tent Work in Palestine," he says:—

"The routine gradually growing up for the execution of the work underwent but little change during the whole period of our labours. The party first rode out to various points round the camp within a radius of fifteen miles, from which good views might be expected. As each was found satisfactory or one near it preferred, great cairns, eight or ten feet high, were built and whitewashed. This work took about five days. When the points were chosen five more days were consumed in revisiting them with the theodolite, which travelled in its box, bound to the back of a mule, the muleteer perched behind it. . . . . From two to four hours were spent at each point, fixing the position of every prominent object, tree, village, white dome, or minaret, visible within ten miles. The names were collected from the peasant who accompanied the party; and as the afternoon shadows began to lengthen, we slowly wound down the hillside, a rough looking cavalcade, preceded by our Bashi-bazouk in his red boots, armed to the teeth, and followed by the non-commissioned officers, who had become well accustomed to their stout little Syrian ponies, whilst the pack-mule and guide came last. We all wore revolvers and the native head-dress, the Bedawin *kufeyeh* or shawl, a sure protection from sunstroke, and substitute for an umbrella. . . . . The theodolite work over and the fixed points laid down, the filling-in of the detail followed. The two non-commissioned officers divided the work between them, and I took alternate days with each, to enable me to do the hill sketching and examine the geology."

When Samaria was finished the camp moved to the Great Plain of Esdraelon, where a new base was measured to check the triangulation. This was found very satisfactory, and when the calculations were completed at Southampton four years later, the

discrepancy on closing-in was only twenty feet. This work was exceptionally severe, and it was whilst aiding in it that Mr. Drake laid the seeds of the disease which afterwards proved fatal.

"The labour of walking over the loose basaltic soil, which seemed to scorch the soles of one's boots, under a noonday sun whose power was unbroken by any friendly tree or cloud, was such as I shall never forget, and more severe than anything with the exception of the desert and Jordan work in the following years."

Whilst working in the Great Plain of Esdraelon, Conder was enabled, amongst many other biblical points of value, to determine the site of the great battle in which the host of Sisera was overthrown by Barak. Although this is not strictly survey work, the conclusions arrived at by Conder are so interesting that they may find a place in connection therewith:—

"Tabor, the central position, a mountain whose summit is 1,500 feet above the plain, is bare and shapeless on the south, but to the north it is steep and wooded, with oaks and thickets in which the fallow-deer finds a home. About three miles west are the springs from which the Kishon first rises, and from this point a chain of pools and springs fringed with reeds and rushes marks, even in the dry season, the course of the river. Along this line at the base of the northern hills the chariots and horsemen of Sisera fled. The sudden storm had swollen the stream, 'the river Kishon swept them away, that river of battles, the river Kishon. The remainder fled to Harosheth, now a miserable village (El Harathiyeh), named from the beautiful woods above the Kishon at the point where, through a narrow gorge, the stream hidden among oleander bushes enters the Plain of Acre. The flight of Sisera himself was in an opposite direction, under the slopes of Tabor and across the great lava plateau, on which stood, near Bessûm, the black tent of Heber the Kenite."

Conder proceeds to explain in a very ingenious manner the reasons for the murder of the fugitive by Jael.

After leaving the Great Plain, the survey was carried into the country round Cana and Nazareth. Here the work was sadly impeded by the difficulties arising from the fanaticism of the inhabitants, as well as by the extreme unhealthiness of the season. Undeterred by these drawbacks, the survey was persevered in and continued around Carmel and Acre, which closed the operations of 1872. Early in the following year, Conder again started to fill in the tract of plain and low hills between Carmel and Jaffa, and from the sea to the Samaritan mountains. On May 30 he received a welcome addition to his little party by the arrival of Corporal Brophy, R.E., though he proved of no great assistance until he had learnt to ride and to speak a few words of the language. By the middle of summer this portion of the survey was completed,

and the operations were suspended until the great heats had passed away. As Conder wrote :—

"The fatigue of the campaign had been very great. My eyes were quite pink all over with the effects of the glare of white chalk, my clothes were in rags, my boots had no soles. The men were no better off, and the horses also were all much exhausted, suffering from sore back, due to the grass diet. The rest, however, soon restored our energies, and autumn found us once more impatient to be in the field."

With the early autumn the party was again afield, and between then and Christmas had added Damascus, Baalbek, Hermon and Samson's country to the map.

"On the 5th November we marched across the Shepherds' Plain, and entered the terrible wilderness which stretches above the Dead Sea on the west, and creeps up almost to the vines and olive groves of Bethlehem."

Here Conder explored the Cave of Khureitûn, which he thus describes :—

"The entrance is reached by creeping along a very narrow ledge on the side of a high precipice of hard limestone in a magnificent desert gorge. The entrance is double and is protected by a great block of stone. The narrow passage leads to a great circular hall cut in rock, and from this other narrow winding passages run yet farther into the heart of the mountain, the windings are extremely intricate, leading from one chamber to another, the farthest being some 200 yards from the entrance. A whole day was spent in planning the place. For 100 feet I followed a a long burrow, so narrow and low that I could only just drag myself along it on my hands and knees with a candle in one hand. Huge bats flew into my face, and more than once extinguished the light, but I succeeded in reaching the very end and in searching out the extremity of every other passage in this extraordinary cavern."

The next task was an anxious and difficult one, being an attempt to do what no European had previously undertaken—a residence for several months in the wild and unhealthy district of the Ghor. The start was made on November 15th, 1873, and much work was done at Jericho, Gilgal and other points, when, in the beginning of December, the camp was laid prostrate with fever. Mr. Drake was the first attacked, but shortly afterwards nearly all the others were also taken ill. Conder gives a sad account of that Jericho fever :—

"During the whole of that winter I suffered from fever. It was an exceptionally severe season ; the Plain of Sharon was a swamp ; the winds in the hills were cold and cutting ; Jordan overflowed its banks and was half-a-mile wide, while the whole valley was merely a quagmire. .... All the intervals of fine weather were employed in field work, and I even camped out near Bethel for three days, but it cost me another

attack of fever, and a third was brought on by a visit to Neby Samevil. Once or twice the fit came on while I was riding, and I can imagine nothing more disagreeable than to be ten miles from home, on a rough road with a fever headache. The ulcers which seem always to accompany fever in malarious climates attacked us all, and altogether the expedition was much shaken. . . . Those who read the above pages will, I hope, be convinced that the survey of Palestine was no holiday task. The results were worth the difficulties we encountered, and Gilgal and Bethabara are, I think, enough to put into the scales against six months ill health."

The Jordan valley was next visited, and on March 11th the triangulation was commenced. Still the effects of the fever were showing themselves :—

"The ulcer on my hand had now been growing bigger for four months. The snow had got into it, and not only my hand but the whole arm also was quite useless from pain. I had, in addition, severe rheumatism in my shoulders which prevented my sleeping, so I rode up forty miles in one day to Jerusalem to see the doctor and get the ulcer cauterised."

In spite of his sufferings, Conder persevered with this portion of the survey, which was completed before the end of April. The results were very valuable, but they were purchased at a heavy price, Mr. Drake succumbed to the fever and malaria, and shortly afterwards died at Jerusalem, whilst Conder was sent to England to save his life. He returned to Palestine in September, after an absence of five months, which had been occupied by the party under charge of Serjeant Black in plotting the results obtained.

On October 5th the party went once more under canvas, and in the course of six weeks the districts of Hebron and Beersheba were added to the survey. In November Lieutenant Kitchener, R.E., arrived and joined Conder, and about the same time Serjeant Black, who had for so long been an invaluable assistant, was attacked by dysentery, and invalided home. In January, 1875, Conder and Kitchener visited Jericho, where the latter was attacked by the prevalent fever, and remained in a precarious state for some time, being unable to assist in any of the more important field operations. Only three districts still remained to be completed, the Desert of Judah, the Philistine Plain, and Galilee as far north as Tyre and Cæsarea Philippi. As Kitchener was still too ill to accompany him, Conder with his two Non-commissioned Officers started for the Desert of Judah on February 25th, where they encountered great hardships, but contrived to complete the survey.

"In ten days of very hard work, a party of three Englishmen had filled in 330 square miles, including visits to the various ruins in the district, and half-a-day spent at Masada. We had just finished the

work when the great storm broke, and could now rest in a dry house, with our beasts in a warm stable, and enjoy the reflection that this difficult piece of the survey was happily accomplished."

The Philistine Plain followed, and then, after a three weeks' rest at Jerusalem, the whole party started for Galilee, intending to finish the northern district of 1,000 square miles within the year. This was not to be, as before they had proceeded far with their operations, they were attacked by the Safed tribe, and after narrowly escaping massacre, were compelled to retreat to Haifa. As it seemed hopeless to persevere in the face of so much fanatical opposition, the expedition returned to England, leaving Captain Conder behind to fight the case against his Safed assailants in the Turkish courts. In this he was perfectly successful, and redress having been obtained, he also returned home.

In 1877 Lieutenant Kitchener went out again, and finished the survey, which occupied him about a year. The map, when completed, was photo-lithographed by the Ordnance Survey Department at Southampton, and published in 1880.

The additions to our biblical knowledge resulting from this work, coupled with the deductions of Captain Conder thereupon, are very important. As a proof of this, the following statistics may be cited:—There are recorded in the Bible 622 names of places west of the Jordan. Of these the number already known and identified prior to the survey was 262. During the survey no fewer than 172 additional sites were fixed, and are now generally accepted, so that there remain but 188 places still unknown, and it is probable that many of these may yet be traced from amongst the 10,000 names collected by Conder's party. The extent of the survey is close upon 5,000 miles.

The expedition for the survey of Eastern Palestine, started in 1881 under Captain Conder, with whom was associated Lieutenant Mantell, R.E. After some delays, caused by the unsettled state of the country, Conder was enabled to cross the Jordan, and to begin operations. He was under the strong hope that the old firman, in virtue of which the Society had been allowed to do so much good work, would still be recognized and accepted. This, however, did not turn out to be the case. Before long he received intimation from the Governor of El Salb that he could not be permitted to carry on his operations, and that he and his party must leave the district. Conder very diplomatically interposed as many delays as possible, with the result that he was able to obtain ten weeks' work before being eventually compelled to abandon it. When at last he did obey the peremptory mandate of the Governor, he had surveyed no less than five hundred square miles, and brought back with him

hundreds of drawings, as well as materials for a whole volume of memoirs.

The only other survey work in Palestine that remains to be recorded is that of the district lying between the mountains of Sinai and the Wâdy el Arabah, which was carried out by Major Kitchener, assisted by Mr. George Armstrong, late Serjeant-Major Royal Engineers, in the year 1883.

CHAPTER IV.

Service in the Households of the Sovereign and Royal Family.

George Morrison—Leonard Smelt, the Sub-Governor to the Prince of Wales and Duke of York—Sir J. M. F. Smith, Gentleman-Usher of the Privy Chamber—Lieutenant Cowell appointed Governor to H.R.H. Prince Alfred—Major Elphinstone named to the same post with H.R.H. Prince Arthur—Major Cowell appointed Master of the Household—Sir Howard Elphinstone made Comptroller to H.R.H. the Duke of Connaught—Captain Fleetwood Edwards appointed Assistant Private Secretary and Keeper of the Privy Purse—Lieutenant Haig named Equerry to H.R.H. the Duke of Edinburgh—Major S. Waller, Equerry to H.R.H. the Duke of Albany—Serjeant-Major Wilson placed over the Royal Laundry at Richmond—Sapper Livingston made Inventory Clerk—Sapper Faulkner Engine-Driver at Frogmore.

The first trace to be found of any connection between the Corps of Engineers and the Court of St. James', is in the year 1753, when George Morrison, an Engineer Extraordinary, is recorded to be "with the Prince of Wales." No mention is made as to what his services were in that position, and we are left to conjecture that he was in some way attached to the person of the young Prince, then in his 16th year.

During the early years of the reign of George III., Leonard Smelt, an Engineer in Ordinary and Captain, was appointed Sub-Governor to the Prince of Wales and Duke of York, who were being educated in great seclusion, the Earl of Holdernesse being their Governor. Smelt had been in the Engineers since 1741, and in 1748 had risen to the rank of Engineer in Ordinary. He remained in the Corps until 1758, his last service being as Chief Engineer at Plymouth, by which time he had risen to the rank of Lieutenant-Colonel. He resigned his post as Sub-Governor in 1776, at the same time as his principal, Lord Holdernesse, owing to some disagreement with other officers in connection with the Princes. Walpole has the following about Smelt, in his "Journal of the Reign of George III.":—

"Lord Holdernesse, though so good a courtier, had recommended Smelt, a thorough Revolution Whig . . . the King offered a pension to Smelt, who with his usual incorruptible virtue declined it. 'Why,'

said the King; 'you have but a small future?' 'Enough Sir,' said he, 'to keep me independent;' and he absolutely refused any pension, following his patron the Earl."

Mrs. Delany wrote thus about Smelt in a letter to Mrs. Hamilton, dated Windsor, December 25th, 1786:—

"Their Majesties were so gracious as to hint their wish for my spending some days at Kew, when they were there, and to make it completely agreeable and commodious, engaged Mr. and Mrs. Smelt, who live there, to invite me to *their house*, a pleasure of *itself* that would have given me wings for the undertaking. I availed myself of the command of the one, and the invitation of the other, and spent part of two weeks there. I think you can hardly be a stranger to the character of Mr. Smelt, a man that has the honour of being *friend to the King*, and who has testified to the world, by his disinterested and steady behaviour, how worthy he is of such a distinction. His character is of the most noble and delicate kind, and deserves the pen of a Clarendon to do justice to it. Mrs. Smelt is a very sensible, friendly, agreeable woman. Their house is convenient and elegant, situated upon the banks of the Thames, open to all its beauties, and guarded from all its inconveniences, and within a short walk from the Royal Lodge. They were visited more than once a day by their Majesties or some of the Royal family. . . ."

Madame D'Arblay, in her diary, gives an amusing anecdote of Smelt during the visit of Mrs. Delany:—

"November 4th, 1786, Mr. and Mrs. Smelt and Mrs. Delany came to us at tea time . . . . The sweet little Princess Amelia . . . . came in during tea . . . . I left every body to play with her, and Mr. Smelt joined in our gambols. She entered into the scheme with great spirit and delight, and we waited upon Mrs. Delany and Mrs. Smelt alternately . . . . In the midst of this frolicking, which at times was rather noisy, by Mr. Smelt choosing to represent a restive horse, the King entered! Now all was quiet, and every one retreated to make way for the King, but the little Princess pertinaciously desired to continue the game, till Miss Burney ventured to whisper, 'We shall disturb the King, Ma'am!' This was enough, she flew instantly to his Majesty, who was in earnest discourse with Mr. Smelt, and called out 'Papa, Go!' 'What?' cried the King. 'Go papa, you must go.' The King took her up in his arms, and began kissing and playing with her. At length he set her down and went on with his discourse. She was not, however, a moment quiet till he retired, and then we renewed our diversions, which lasted till her bedtime."

Smelt died in the year 1800, having a short time before been appointed Deputy Ranger of Richmond Park.

Lieutenant-Colonel Sir J. M. Frederic Smith was in 1833 appointed Extra Gentleman-Usher of the Privy Chamber, and in the following year he became one of the regular Gentle-

men-Ushers, a post which he held until his death in 1874. This, however, was an honorary office conferred on him by the favour of King William IV., and was in no way due to his being an Engineer Officer. It is very different with those who have since been attached to Her Majesty's Court.

Reference has already been made to the fact that the good work done by the officers who were engaged under Sir William Reid, in the Great Exhibition of 1851, attracted the favourable notice of the Prince Consort. He had taken such a lively interest in the welfare of that undertaking, that no one who aided him in it passed unnoticed. He found that in the Corps of Royal Engineers the country possessed a body of men, who by training and intellect, were capable of a great variety of duties, and whose military organization rendered them valuable in almost any position. It was natural, therefore, that a Prince gifted with such keen discernment should have recorded in his own mind the existence of a source from whence he could draw a supply for any needful work. It followed that when the time came for him to select a tutor and governor for his second son, he should turn to the Corps for the best-fitted man.

The Crimean War had just ended, and Sir Harry Jones, who had been Commanding Royal Engineer during all the later portion of the Siege of Sebastopol, had during its course seen of what metal the men who served under him were made. To him the Prince turned, explaining the stamp of man he desired to secure. It was a post requiring many qualifications, and one not easy to fill. The holder of it should be gifted with extreme firmness, combined with tact. He should exercise the greatest and most unvarying vigilance, as he would be constantly called on to act with decision without much time for reflection. Combined with these gifts he would have to be a man of culture and courtly bearing, able to take his place in the highest ranks of society, both at home and abroad, and to maintain his position wherever he might be placed. Although not himself expected to undertake any portion of the Prince's education, he would have to supervise it, and therefore, he should be a man of extensive and varied reading. Such were a few of the most important qualifications demanded, and Sir Harry Jones at once placed his hand on the man who he knew was possessed of them, and submitted the name of his late Aide-de-Camp, Lieutenant J. Cowell, R.E. The experience of many years has shown that no wiser choice could have been made.

Lieutenant Cowell accepted the post, and in the month of April, 1856, became Governor to H.R.H. Prince Alfred, afterwards Duke of Edinburgh. He held the office for nine years, during which

time he accompanied his charge to various parts of the world. The young Prince, being intended for the Naval service, was at an early age appointed a midshipman on board H.M.S. *Euryalus*, commanded by Captain Tarleton, C.B. Lieutenant Cowell went with him, and in all matters not strictly connected with the discipline of the ship, or with Prince Alfred's duty as a naval officer, he was in supreme control. This was not an easy post, and much tact was required to combine the Prince's high social position with his subordinate status as a midshipman. As long as the ship was at sea no difficulties could arise. He was treated as any other junior officer would have been, and the responsibility of enforcing strict discipline fell upon the captain and other senior officers. When, however, a station was visited, and the Prince landed, everything was changed, and from the moment he placed foot on shore the young midshipman, as the son of Her Majesty, was treated with Royal honours. On his governor fell all the responsibility as to how far this ceremonial should be carried, what amount of entertainment and social intercourse his pupil might be permitted to enjoy, and generally to watch over his material and moral well-being. It was a grave responsibility, and it is generally admitted that it was most ably sustained. A strong proof of this lies in the fact that the Prince Consort, whose ideal was a high one, was so thoroughly satisfied with his first selection that when Prince Arthur grew old enough to require a similar mentor, it was once more in the Corps of Engineers that the officer was sought for. This time Major Elphinstone was selected, and again the results proved that the right man had been found. In both of these cases it has been said that the Prince Consort made the appointments. In one sense, of course, it is clear that Her Majesty was the nominator; but it is equally well known, by her own published statements, that in all matters of this kind she allowed herself to be entirely guided by the wise Prince who was her Consort. Without, therefore, in any way derogating from the Royal supremacy, it is quite correct to attribute the selections to the Prince Consort.

In the year 1865 Major Cowell's duties in connection with the Duke of Edinburgh ceased, when that Prince came of age, and formed his own household. For a few months, at Her Majesty's special request, he undertook a similar office in connection with Prince Leopold; but this was speedily terminated by his being offered the post of Master of the Royal Household. This he accepted, and in it he has remained since that date. It would not be seemly to enter into any details in connection with his duties in this capacity, as it would not be possible to do so without lifting the veil of that privacy which is as dear to Her Majesty

as to the meanest of her subjects. Still, it can well be imagined that the organization and due administration of so vast and complicated a machine as the Royal Household is one requiring constant vigilance, and in which the talents of the Engineer find free play. Details which in a small and private establishment are of minor importance become greatly magnified, and require keen superintendence when developed on the scale in which they are found in Windsor Castle, or at any of the other Royal palaces. Questions of air, ventilation, lighting, warming, and the like are, by their very extent, much complicated. When to this is added the necessary precautions for the preservation of the countless costly treasures contained in the palaces, it will be seen that the work is arduous. It is, moreover, one which requires at its head a man well versed in architectural and engineering science. Structural points are naturally constantly arising. Modern improvements may be developed, even in a palace, and science requires to be applied there more urgently than in humbler dwellings. In all this the training of the Engineer is most valuable, and there can be no doubt that under the *régime* of Sir John Cowell, it has been carried to a very high pitch, and that he has raised the details of domestic administration to the level of a science.

As already mentioned, Major Howard Elphinstone was selected as Governor to H.R.H. Prince Arthur. He commenced his duties in January, 1859, and continued his charge throughout the period of the Prince's minority. On his coming of age, Elphinstone (now Sir Howard Elphinstone) received the appointment of "Comptroller to His Royal Highness the Duke of Connaught." He went with the Duke to Canada, when he was serving with the Rifle Brigade, and during that time accompanied him in his visit to the United States. Since then he has been with the Duke in the Holy Land, and of late has followed him to India during the period of his tenure of the Bombay command. He still continues to hold the same office in the Household of the Duke.

The third Engineer Officer to be attached to the Court was Captain Fleetwood Edwards. This officer, having served as A.D.C. to both Sir Frederick Chapman and Sir Lintorn Simmons, was selected to fill the post of Assistant Private Secretary and Assistant Keeper of the Privy Purse to Her Majesty in 1878. His duties in this capacity include correspondence with many official authorities, reporting upon despatches or telegrams, and generally carrying out the various confidential duties of a Private Secretary. He also has to do with the recommendation of the recipients and the distribution of Her Majesty's private charities. He was further appointed Groom in Waiting in 1880. His services in

these posts, which he still holds, have been rewarded by the C.B. in 1882, and the K.C.B. (both civil) in 1887.

Lieutenant Arthur B. Haig was appointed Equerry to H.R.H. the Duke of Edinburgh in March, 1864, and held the appointment until 1880, when he resigned it, and was made Extra Equerry. He accompanied the Duke in H.M.S. *Beacon* in 1865, and again in H.M.S. *Galatea*. He was in attendance on His Royal Highness during his visits to Australia, New Zealand, and the Cape of Good Hope, as well as in Japan, China, the Pacific, and India. In 1876 he received the C.M.G. for services in the Colonies of a more or less confidential character, his name having been most favourably mentioned by several Colonial Governors whilst acting in this capacity.

Major Stanier Waller was appointed Equerry to H.R.H. the Duke of Albany in December, 1879, and held that post until the death of the Prince in 1884, when Her Majesty appointed him Extra Equerry to herself, an office which he still fills, in combination with his ordinary Corps duties.

Mr. T. Wilson, late Serjeant-Major of the Royal Engineers, is Superintendent of the Royal Laundry Establishment at Richmond. Mr. Wilson enlisted in the Royal Sappers and Miners in April, 1854, and served with the 26th and 20th Companies. He was promoted Quartermaster-Serjeant in 1871, and Serjeant-Major in 1874. He was pensioned in 1875, and appointed to his present office in the same year. The position he occupies is one of great trust and responsibility. The Royal Laundry was built about forty years back, on designs prepared by Mr. Cubitt from the general idea sketched out by the Prince Consort. Its position renders it convenient both for Windsor and Buckingham Palace, and it receives the linen from both palaces daily, as well as from Osborne when the Court is residing there. It can be easily understood that there is an immense amount of work to be carried out with punctuality and rapidity. There is also a vast quantity of valuable property to be carefully checked and protected, whilst the necessary privacy is always to be ensured. Without the aid of machinery it would be impossible to do what is required. This may the more easily be understood when it is stated that the household linen alone which passes through the establishment amounts to an average of 700,000 pieces per annum. To keep such a concern in full working order, with a staff of only thirty-four persons, including the engine-driver, necessitates much organization and the strictest probity. It is well known that Mr. Wilson has proved himself a valuable acquisition in his office, and has brought credit on the Corps as well as on himself by the manner in which he has filled his post.

Sapper J. W. Livingston, after twelve years' service on the Ordnance Survey, took his discharge in 1866, and had been employed in South Kensington for eight years, when he was selected to fill the appointment of Photographer and Draughtsman at Windsor Castle. After holding the post for ten years he was, in 1884, promoted to be Inventory Clerk, a situation which he still retains.

Sapper Henry Faulkner, after a service of twenty-one years in the Corps in various parts of the globe, was discharged in 1877, and at once taken on as smith and engine-driver at the Royal Gardens at Frogmore, and still continues in that capacity.

In concluding this sketch of the connection of the Corps with the inner life of the Court, it may be mentioned that at Windsor Castle there are a series of pictures illustrating the different branches of the British Army. The Royal Engineers are represented by three portraits in one frame. In the centre is an officer (Captain Hall, R.E.) in full dress, with a roll of plans in his hand. On one side of him is a Serjeant of Royal Sappers and Miners (Serjeant J. Johnstone), and on the other side a Private of the same Corps (Private G. Allan).* These three portraits were taken from life by order of King William IV. in 1832. The artist's name is A. Dubois Drahoust.

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* Private Allan became Serjeant-Major of the Corps at Chatham, and was well known to all the officers who passed through the School of Military Engineering some forty years ago. He was celebrated for a very powerful voice, which was most valuable for drill purposes, especially when pontooning was being practised.

CHAPTER V.

Colonial, Foreign, and India Office Work.

Sir Archibald Campbell Governor of Jamaica and Madras—Sir William Reid at Bermuda—The Good Governor—Promoted to Barbados—His Resignation—Appointed to Malta—Sir William Denison at Van Dieman's Land—The Transportation Question—The Irish Political Prisoners—Government of New South Wales—Responsible Government—Pitcairn Islanders—Government of Madras—Temporary Appointment as Governor-General of India—Sir Andrew Clarke Governor of Straits Settlements—Member of Indian Council—Sir Lintorn Simmons Commissioner with the Turkish Army—Consul-General at Warsaw—Military Adviser to Lord Beaconsfield at Berlin—Governor of Malta—Sir Edward Stanton Consul-General at Warsaw and in Egypt—Chargé d'Affaires at Munich—Sir Charles Warren in Griqua and Bechuana Land—Desert Expedition in Search of Palmer and his companions—Second Bechuanaland Expedition—General Gordon at Khartoum—Afghan Boundary Commission—List of Governors—Indian Appointments—Officers under the Egyptian Government.

In the year 1780 Major-General Sir Archibald Campbell was appointed Lieutenant-Governor of Jamaica. Two years later he was made Captain-General and Governor-in-Chief of that island, and in 1785 he was transferred to the Government of Madras. This was the first instance of an Engineer being placed at the head of a colony, and it was not apparently followed up at the time, as it was only about fifty years ago that that long series of appointments began under the Colonial, Foreign, and India offices, which it is proposed to treat of in this Chapter. It will not be possible within reasonable limits to give in any detail the services of all the officers, in the several capacities in which they have held rule; but some of them have performed the duties entrusted to them with such brilliant success that a short sketch of their career as "proconsuls of broad provinces" seems advisable. With regard to the remainder, a mere enumeration of the posts they have filled, and it may surely be added, most worthily filled, is all that is possible in such a limited space.

The first service of Major-General Sir William Reid under the Colonial Office was his appointment as Governor of Bermuda, in the year 1839. Slavery had then only been a few years abolished, and for the most part the recently manumitted portion of the

population was without even the first rudiments of education. The newly-appointed Governor commenced his beneficent rule by establishing parochial schools throughout the Colony, and procured annual votes from the Legislature for their support. It was no easy matter thus to inaugurate a work, which, once begun, has from that time developed into a very excellent system of education, and the credit of it has by general consent been awarded to Colonel Reid.

For the same reason (the recent abolition of slavery) agriculture and horticulture were also in a very crude state; the chief implement for tilling the ground was a hoe, and the exports were confined to arrowroot and onions, the latter being sent only to the West Indies. Reid soon perceived that Bermuda might be easily converted into a market-garden for the large and rapidly increasing cities of the United States, and he set to work to train the people in an improved system of cultivation. He purchased the discharge of some soldiers who had a knowledge of gardening, and employed them as instructors; he imported ploughs and other suitable implements; he introduced the best varieties of seeds; and by holding horticultural shows, ploughing and mowing matches, and other means, stimulated the people to adopt an industry, that may now be considered the main support of the island. He started a Public Library, which has since assumed very respectable proportions, and in so many other ways developed the resources of the place, and improved the mental training of its inhabitants that he has since been always known as the "Good Governor." To this day his name is revered as the author of all the prosperity that Bermuda has enjoyed, and which has been justly considered the result of his wise and beneficent measures.

From Bermuda Colonel Reid was transferred to Barbados as Governor of the Windward Islands. Here also he devoted himself to the amelioration, moral as well as physical, of the people. Whilst engaged in this benevolent work, his career was cut short by an unfortunate incident in connection with the island of St. Lucia. A question having arisen as to the culpability of the Chief Justice of that island, in a case of libel, which had been referred home by the Lieutenant-Governor, Reid was instructed to investigate the matter, with power to suspend the offender if he considered him guilty. This he did, and his act was at first approved at the Colonial Office. The Chief Justice, however, eventually succeeded in procuring the cancelling of his suspension, and was restored to his post. Thereupon Colonel Reid resigned, and in spite of many efforts made by the Colonial Minister to induce him to change his determination, he persisted in his

purpose, and left the island deeply regretted by all who knew how beneficial his rule had been, and how righteous his judgment was in the St. Lucia scandal.

After the close of the International Exhibition of 1851, Sir William Reid (who had received the distinction of K.C.B. for his eminent services as Chairman of the Executive Committee) was appointed to the Government of Malta. Whilst holding that office the Russian War broke out, and Reid was enabled to render the most important assistance to the British army in the Crimea during the difficulties and privations of the winter of 1854-5. This will be found referred to in his biography. He was, however, by no means negligent of the interests of the Maltese during this exciting time.

The following reference to his civil work at this period is from the pen of Sir Charles Lefroy, extracted from a paper read by him before the Royal Society, and published in their "Proceedings," in November, 1858:—

"To that Island" (Malta) "Sir William Reid carried all the unostentatious activity which had distinguished his former Governments. In a time of extraordinary difficulty, when Malta became an *entrepôt* of the first importance to the British army in the East, all its resources were strained to the utmost; still he managed to meet every demand, and while he restrained the political excitement of the day he carried forward homely designs for the permanent benefit of the people. Thus he founded a botanical school for the working classes, he imported improved agricultural implements, he introduced a new species of the cotton plant and other seeds adapted to the climate; he established barometers in public places to warn the Maltese fishermen of impending gales; he took in hand the Library of the old Knights of Malta, and by the introduction of modern books fitted it to become a true public library for a large community. Whatever attainable practicable object commended itself to his judgment that he undertook with the same quiet determination which in 1851 enabled him to falsify adverse predictions, and attain the object to which he was pledged. . . ."

The Government of Malta was the last Colonial appointment held by Sir William Reid. He returned home in 1858, and died shortly after.

Major-General Sir William Denison commenced his career under the Colonial Office as Lieutenant-Governor of Van Dieman's Land. In his work, entitled "Varieties of Viceregal Life," where he gives a full account of his experiences as a Governor, he states that in the year 1846 Mr. Gladstone, the then Secretary of State for the Colonies, applied to Sir John Burgoyne to name an Engineer officer qualified to act as Lieutenant-Governor in that Colony. Denison was at the time a Captain of five years' standing, but he had already shown such marked ability that Sir John, without

hesitation selected him, and in the month of October, 1846, he sailed for the scene of his new labours.

Van Dieman's Land was to a certain extent under the Government of New South Wales, but the subordination was more in form than reality, the Lieutenant-Governor being actually almost autocratic. He corresponded directly with the Secretary of State, and, as the communication with England was very slow, he was practically his own master. He took over the reins of government in a somewhat troublous time. The question of the transportation of convicts was creating much discussion and ill-feeling. Its cessation in New South Wales had left Van Dieman's Land the sole receptacle for the criminals of the mother-country, and the settlers generally were strongly against its continuance. When Denison landed at Hobart Town the population of the Island amounted to about 66,000, of whom nearly one half were convicts still under sentence, and of the remainder a large proportion either had themselves been, or were the descendants of the same class. This large infusion of the criminal element, which had hitherto led to the prosperity of the Colony, was now assuming proportions very distasteful to the free settlers. The bitterness was enhanced by the action of the Imperial Government, which strove to make a marketable commodity of the convicts, whose labour was sold to the Colony at a high rate. Denison records on this point:—

"The storm commenced towards the latter end of the government of Sir John Franklin; it blew a violent gale during the time that Sir Eardley Wilmott was Governor, and I found it on my arrival a perfect hurricane of talk and newspaper abuse, the wind blowing from every quarter, but most violently of course from that where self-interest had its hand on the bellows. The action of the storm had affected the Legislative Council; six out of eight of the nominee members had resigned their seats, and these vacancies having been filled up by my predecessor the pleasant task of settling the claims of the two parties, or of picking out of the twelve the six best qualified men devolved upon me."

This question gave Denison infinite trouble, but eventually he was able to allay the storm. From the beginning he took a somewhat different view of the case from the abolitionists. He saw how beneficial the ample supply of cheap convict labour might prove, and his Engineer training led him to desire the development of public works in the form of roads, bridges, wharves, &c. To carry out these most desirable objects, it was absolutely necessary that there should be no difficulty in procuring workmen, and it was therefore most unadvisable to check the importation of convicts. The matter became, before long, further complicated by the discovery of gold in Australia. Unquestionably the retention of the transportation system in Van Dieman's Land saved that

colony from many of the difficulties which arose in those where free labour only was to be obtained. In a letter to Earl Grey, dated June 14th, 1851, he wrote :—

"Your Lordship will probably have heard ere this can reach you of the discovery of a gold field in New South Wales. Thousands are flocking to the diggings, and there seems every reason to dread a most injurious extension of the Californian mania, exaggerated as regards ourselves by its proximity. Shepherds are leaving their flocks in New South Wales; ships are laid up in Sydney harbour, as the sailors leave them and go to the diggings, and the price of every article has risen enormously. Here we are protected from the evil to a certain extent by the presence of the convicts, a class who cannot leave the colony, but should a sudden change in the policy of the Government put a stop to transportation, we shall feel it most deeply in the ruin of most of the landed proprietors, who form now the basis of a sound and healthy population."

During the greater portion of Sir William Denison's government, this question remained a bone of contention between him and his Council; and when representative government was granted he had much difficulty in conducting affairs, owing to the unpopularity of his views. Eventually the home authorities acquiesced in the demand of the abolitionists, and the further importation of convicts was forbidden. By this time most of the works which Denison had projected were completed, and he loyally adopted the necessary measures to render the new system as little burdensome as possible. When he left it was universally admitted that Van Dieman's Land was far ahead of any of the other Australian colonies in the development of its system of public works. In a letter to his mother he wrote :—

"The people in the adjoining colonies are beginning to find out the advantage of having an officer of Engineers as Governor. I have had references made to me from Sydney, Melbourne, and Adelaide, not merely from the Government, but from the Town Councils, applying through the Government for my advice on various subjects, such as the construction of docks, the supply of water, the construction of canals, the formation of a harbour. I am going to send all these applications home to the Inspector-General of Fortifications as an indication of the value of the varied mass of information which an officer of Engineers may, *if he chooses*, pick up in the course of his professional career."

The arrival of the Irish political prisoners, in the month of October, 1849, created a new difficulty. The directions sent from home laid down that they were to be granted tickets-of-leave, provided their conduct was good. When, however, these were offered to them, Smith O'Brien and McManus declined to come to any terms with the government; they would accept no ticket-of-leave;

they would make no promise or engagement, nor do anything which would seem to imply acquiescence in the situation in which they were placed. Meagher did not go so far as this, but he accepted his ticket for six months only. The Governor directed that O'Brien should be sent to Maria Island, and McManus to Salt Water River, where they were to show themselves so many times each day to the Superintendents, and were to be confined within strict limits. Smith O'Brien made an attempt at escape, which was thwarted; but Meagher and McManus ultimately succeeded in evading their custodians by a breach of parole,* and the trouble ended by the arrival of a pardon for Smith O'Brien, who left the colony in June, 1854.

One curious difficulty occurred during Denison's period of office. He had been requested by the Secretary of State to give his opinion on the proposed new constitution for the colony, and in doing this he found it necessary to make some general remarks on the state of society. This was a strictly confidential letter, and was so marked by him. Unfortunately, through some oversight at the Colonial Office, it was published in a Blue Book, and in that form found its way back to Van Dieman's Land. The result was naturally very irritating to those who considered themselves reflected on. Whilst the agitation was at its height, Denison was to visit Campbell Town to be present at an agricultural show. He had been invited to a public dinner before the obnoxious despatch arrived, but he now received numerous intimations that he would be insulted if he went, and urging him to abandon the visit. This he steadily refused to do, as he felt that it would appear he was afraid to meet the malcontents. He was present at the show, discussed cattle and other agricultural questions with the farmers as though nothing were amiss, and in due course attended the dinner.

There he found matters very cloudy and unpleasant, and when his health was proposed by the chairman, it was received in chilling silence. Undaunted by this hostile manifestation, he rose, and in a well-considered speech pointed out the misapprehension under which his hearers were labouring as regarded the intention or tendency of his despatch; and after a brief explanation he drifted off to agricultural topics, giving them some of his own experiences, and so interesting his hearers that they forgot their grievances, cordiality was restored, and when he sat down he was cheered vociferously.

It was to be supposed that a man of the mental calibre of Sir William Denison could not be at the head of a colony which had

* McManus had at this time given a temporary parole.

been for so many years a penal settlement without studying deeply the question of crime and its punishment. During his residence at Hobart Town, he submitted to the Government a number of able papers on the subject. Many of these are most interesting and thoroughly well thought out. Denison was thoroughly opposed to the principle of petting criminals. This he put very strongly in one of the ablest of his papers, addressed to Mr. Labouchere :—

"There is a sort of maudlin sentimentality prevalent in England, which leads people to consider the felon, not as a man who has broken through all laws human and Divine, but as one who by the fault of others, not his own, has been placed in circumstances where the temptations to sin or to commit offences against human laws were irresistible. I would submit that this not at all a proper view to take of the conduct of such a man, neither are we justified in measuring his liabilities by such a scale ; but even were these sentimentalists right in their view, I would point out that the necessary consequence of sin is punishment. This we attempt to regulate according to the nature and degree of the offence, the object being, by the infliction to warn the individual of the risk which will accompany the repetition of the offence, and to hold him out *in terrorem* to others." . . . .

Denison had passed through a stormy time whilst ruling over the destinies of Van Dieman's Land; but he ended in overcoming all opposition, not by force, but by argument and results. Few men had been so unpopular as he during the first half of his administration; but before the period of his stay in the island had drawn to its close all prejudice had subsided, and his sterling qualities, excellent judgment, and clear sense of right and wrong, were publicly recognized. When he left Hobart Town to take up his second appointment in New South Wales, he received an ovation such as is but rarely accorded to an outgoing Governor. This was accompanied by a testimonial of the value of £2,000, which was devoted to the purchase of a service of plate.

The change took place at the beginning of 1855, when he was sworn in at Sydney as Governor-General of New South Wales.

The two first objects to which he devoted his attention, in this fresh sphere of labour, were the Mint, then being established, and the development of a system of railways. At the end of his first year he addressed a letter to Colonel Harness, R.E., which embodies his views on both these subjects very clearly :—

"Ward is here working out his Mint satisfactorily," (This was Colonel E. W. Ward, R.E., who was appointed at the head of the Mint on its first establishment at Sydney.) "in face of a good deal of opposition. In point of fact, the establishment of a Mint was advocated by

the Council here on wrong grounds altogether, and when I arrived and had looked over the papers on the subject, the difference between the views of the original proposers and those of the persons who then maintained the establishment of a Mint struck me as most marked and curious. However, both parties recommended the maintenance of the Mint, and I, after talking the matter over with Ward, came to the same conclusion. We got the Mint to work, and have been gradually increasing the amount of the coinage till it exceeds one and a half millions annually. I wrote a long despatch to the Secretary of State on the subject, pressing upon him the advantage which would be derived from making this in reality that which it professes to be, a branch of the Royal Mint, and giving to the coinage the title of 'Coin of the Realm.' . . . . If the Government were to make this a branch of the Royal Mint, the result would be that a large proportion of the gold coinage of the British Empire would emanate from it; the raw material would have its stamp affixed to it, and be sent in that state to England, instead of, as now, going there in the shape of dust."

These ideas were in advance of the public opinion of the day, and it was not until some years later that the principle thus early advocated by Denison was adopted, when the results foreseen by him occurred. His views on the subject of railway communication in the colony may be gathered from a subsequent portion of the same letter:—

"I look forward to a great extension of our public works, especially of all those which tend to improve the means of communication." (Here we see the Engineer element in the busy brain of the new Governor.) "Just figure to yourself a country 1,000 miles in length and 350 miles in breadth, without a single river to break the continuity of this long range of country, whose course (navigable) extends more than fifty miles. Roads, there are none worthy of the name; for canals you have no water. What is to be done then to rescue this country from the sterility to which it is condemned? What means have we of opening it out and giving to the land a value which will insure its becoming saleable? Roads, say some;—railroads, say I. . . . . I am trying experiments upon the friction of railway wheels, another upon their adhesion to wood as compared with iron, my object being to ascertain whether we may not be able to save much cutting in the undulating country through which the railways must pass, and by the use of wooden rails to follow the line of the ordinary roads without subjecting ourselves to heavy rises or inclines, or without being obliged to turn to avoid these. If I could manage to make such lines for £5,000 or £6,000 per mile, I should not hesitate an instant to recommend the construction of such a network of railways as would cost in the course of twenty years upwards of twenty millions. . . . . The Government possesses 200 million acres of land; if, by the sacrifice of, say ten or fifteen millions of these, we can give to the remainder a value which it has not, neither can hope to have, without improved means of communication, the bargain would be a satis-

factory one, for the remaining 190 millions would be worth far more than the original 200 millions."

It fell to the lot of Sir William Denison to inaugurate the new principle of responsible government at Sydney, and it is somewhat amusing to read of the difficulties he encountered in this task. The Duke of Newcastle had defined this innovation as "Government by party," and Denison stated in reply, that in the Australian Colonies there were not the elements out of which political parties could be formed. In a letter to Mr. Labouchere, he wrote :—

"Although the terms constitutional and unconstitutional have been bandied about like shuttlecocks from one side of the House to the other, the only question before the mind of every speaker has been a purely personal one: 'Why was not I asked to become a member of the Government?' The opposition does not object to any of the measures mentioned in the speech; but Mr. A—— says, 'I ought to have been sent for instead of Mr. B——. I have more experience, more administrative ability, am, in short, a better man.'"

It was not without the greatest difficulty, and a constant change of Ministers, that he succeeded in keeping the new legislative machine in motion. One of the most interesting incidents of his government was the transfer of the Pitcairn Islanders to Norfolk Island. In writing to his brother on this subject he said :—

"We are going to put them upon an island provided with cattle which they have never seen, sheep of which they know not the use, machinery, such as mills, &c., of the application of which they can have no conception. It will be a curious and interesting occupation to watch the development of their ideas under these very novel circumstances. I am afraid that their simplicity will wear away fast under the operation of the new influences brought to bear upon them. I have, however, done my best to isolate them by directing the officers, who are going down in charge of the vessel, and who will locate them in their individual allotments, to divide the whole island (which contains but 10,000 acres) among the families, with the exception of about 500 acres for public purposes and 200 for church and schools, so as to leave no room for other settlers."

The result proved very satisfactory, and the entire colony was transferred, in the month of July, 1856, to Norfolk Island. They numbered 194, including an infant born during the voyage, who was christened 'William Denison.'

In September, 1860, Sir Charles Wood addressed a letter to Denison, offering him the Governorship of Madras. In this he wrote :—

"I have this morning a letter from the Speaker" (Denison's brother) "who says that I may rely on your undertaking any duty which is for the public service without hesitation, and I therefore write to you in the

fullest confidence that you will accept the government. I think you the best man for it. If you had been at home I should have offered it to you at once. The inevitable loss of time was a serious objection, but a good Governor was better than a less fit man."

This offer was accepted, and Sir William Denison arrived at Madras in February, 1861, to assume his new office. It seems a curious fatality that in each case where he took over a government, he was called on to face a change in the constitution. In Van Dieman's Land it was a representative assembly which he was required to introduce. In New South Wales it was the complete development of responsible government, whilst at Madras it was the change from the rule of the East India Company to that of the Crown. This involved the amalgamation and reduction of the native army, the collection and augmentation of the revenue, the improvement of the means of communication, and the development of the system of irrigation. These were the subjects which Denison himself laid down as those requiring his most earnest attention, and throughout the duration of his government he devoted all his energies to their solution. In a letter addressed to Captain A. Clarke, R.E., dated June 8th, 1861, he wrote:—

"I am at present busy upon two knotty questions—the constitution of the Public Works Department, and the reduction of the army. The Public Works Department was transferred from the Revenue Department to the Engineers some years ago, in accordance with the recommendation of a Commission composed of men unconnected with the department. The Commissioners worked out a very pretty theoretical scheme, showing a gradual chain of responsibility from the overseer up to the Chief Engineer, and a beautiful system of accounts and checks, by which the Government was to be able to tell at any instant what works were going on, how they were advancing, what they had cost, &c.; but as this scheme supposed that every man was perfectly master of his part, it, of course, broke down in practice. The system of accounts was so elaborate and so onerous that, practically, the Government paid a shilling to avoid the risk of being cheated out of sixpence . . . . This subject has taken up a good deal of my time, for I have been forced to read up a mass of papers, and even now, though I see clearly the mistake committed by Lord Dalhousie in adopting the report of the Committee as a whole, I find great difficulty in scheming out a plan which may work satisfactorily . . . . The reduction of the army is a question I am about to take up seriously, and I have called for information which may enable me to apportion to each district or military division of the country such a force as may be sufficient, in connection with the police, to keep everything quiet internally, as well as to repel any attack from without. I feel certain that when I have gone carefully into this I shall find that half my present force will be sufficient for all the wants of Madras."

One of the great objects of the home Government at this time

was the development of the cotton cultivation in India. To carry out this view extensive public works had been begun, with the object of improving the interior communications of the country, and facilitating the transport of the cotton to the sea. In order to secure this object, and at the same time to provide irrigation for the neighbouring districts, a grand scheme was in progress on the river Godavery. One of the first journeys taken by Denison after his arrival in the country was a visit to the scene of these works. He wrote a very able minute on the subject, in which he strongly criticised the plan, and pointed out what he considered would have been a more satisfactory method of procedure. Indeed, in all his various governments he brought his great Engineer talents to bear on the various questions submitted to him. His previous training in the Admiralty was now of the utmost value to him, and enabled him to deal with the Public Works Department in a far more satisfactory manner than other holders of the post had been able to do. He did not, however, in any way confine his attention to the Engineer, or indeed to the military aspect of Indian affairs. He devoted himself at the same time to a careful study of the native character and of British policy as affected thereby.

In 1863 he addressed a letter to the Secretary of State, which gives his views on this subject:—

"I should be really glad were I able to look more hopefully to their future—could I see in them the elements of improvement. Hitherto education has done but little for the Hindoo: it has not developed him intellectually so much as it has lowered him morally. The truth would seem to be that their religion, being purely formal, and having no connection with anything moral, or, I may rather say, having an intimate connection with the most brutal forms of immorality is not operated on by that which tends to develop the intellect. The educated Hindoo does not believe in Brahma or Vishnu; but he avails himself of the license which the profession of such religion permits, or rather encourages. He lives entirely for the present, and uses the power which knowledge gives him to make that present as pleasant as possible."

On November 20th, 1863, Lord Elgin, the Governor-General of India, died, on his road to Lahore, and Sir William Denison was called on to assume his functions pending the arrival of a successor. There were many important public questions requiring prompt decision, and consequently his presence at the seat of government. He therefore proceeded at once to Calcutta, where he was sworn in and installed in office. He was not long left in idleness; indeed, the principal matter which brought him up so rapidly required immediate action. The Lieutenant-Governor of the Punjab had obtained permission to use a body of 5,000

men, to act against a mountain tribe on the frontier, who had re-occupied Sitana (whence they had been driven in 1858), and from there they were making inroads on our territory. General Chamberlain was placed in command, and he made his way with the column up the Umbeyla Pass. There he encountered serious resistance; his further advance was checked, and he was practically besieged in his camp. As soon as the Government became acquainted with the state of affairs, reinforcements were moved to the front, and arrangements made for the further conduct of the campaign.

Meanwhile the Lieutenant-Governor became alarmed at the unexpected results of the incursion he had planned, and at the drain caused thereby on the troops in the Punjab. He, therefore, urged the withdrawal of Chamberlain's column, and in this he was seconded by the Military Secretary to the Government. During the interval between Lord Elgin's death and the arrival of Sir William Denison, the Council had acceded to the wishes of the Lieutenant-Governor, and had directed, on November 26th, that the troops should be withdrawn "as soon as it could be done without risk of military disaster, or without seriously compromising our military reputation." Denison had been able to peruse the papers and study the question whilst on his transit up the Hooghly, and he records the view he took of the matter thus:—

"The most startling fact of all, especially when taken with reference to the report made by General Chamberlain of his position and prospects, not more than ten days previous, was the morbid fear which seemed to have influenced the Government of the Punjaub, and the Military Secretary to the Government of India, making the one propose and the other recommend the withdrawal of the troops, while the members of the Council at Calcutta, partaking of, or influenced by, this alarm on the part of the originators of the movement against the tribes, had backed up the recommendation by a statement to the Commander-in-Chief, that the object of the Government was to withdraw the troops as soon as it could be done without loss or discredit. . . . I felt convinced that nothing could have happened during the short interval which had elapsed since General Chamberlain had made his report, to justify such a cowardly policy, which, if acted on by the Commander-in-Chief, would at once bring the whole of the tribes on us. I therefore, made up my mind at once, to press upon the members of the Council the advisability of reversing the order given to the Commander-in-Chief; and, should they not agree to do so, to act upon my own authority and direct the Commander-in-Chief to make a forward instead of a retrograde movement."

This was a bold measure for a man who was only a *locum tenens*, but Denison was never wanting in the courage of his convictions, and at the Council held on December 4th, he succeeded in carry-

ing a majority of the members with him, so that the order was cancelled. The result was most satisfactory; the reinforcements were pushed forward, Chamberlain made his advance, the tribes were severely chastised, and the affair was settled satisfactorily. The prestige of the British arms was restored, and the insurgents received a lesson which they did not quickly forget.

Denison was only a few weeks at Calcutta. Sir John Lawrence, who had been named to succeed Lord Elgin, arrived on January 12th, 1864, and the Acting Governor-General returned to Madras. There he continued until March, 1866, when his period of service having expired, he was relieved by Lord Napier and returned to England, having left behind him many marks of the beneficent influence of his rule. With this post his service under the Colonial and India Offices terminated.

The connection of Lieutenant-General Sir Andrew Clarke with the Colonial service began by his being appointed, in 1849, Private Secretary to Sir William Denison, R.E., Governor of Van Dieman's Land, on the death of Captain Charles Stanley, R.E., who had previously held the office. In 1851 he was placed on the Legislative Council of that Colony to take charge of the conduct of public business in the Council. In 1853 he was appointed Surveyor-General of Victoria, then a post held under the Crown. In 1856 a new constitution was given to the Colony, and responsible government established. Under these circumstances the place filled by Captain Clarke was abolished, and he received a pension as compensation for its loss.

He did not, however, avail himself of this fact to quit the Colony and return to his military duties, but obtained a seat in the new Parliament as member for South Melbourne, and formed one of the first Victorian Cabinet, as Chief Commissioner for Crown Lands. It is a circumstance worthy of record that Captain Charles Pasley, R.E., who had been Chief Engineer of Public Works under the Crown, also obtained a seat in the new House for the Metropolitan county, and became a member of the new Government, as Minister of Public Works. These appointments were held under the usual Parliamentary condition of resignation on a change of Government. This occurred in 1858, when Captain Clarke returned to England. He did not revert to the Colonial service until 1873, when he was made Governor of the Straits Settlements, in succession to Sir Harry Ord. This Government had only recently been severed from its connection with India. It had until 1868 been administered by a Resident under the control of the Governor-General, but was from that date brought under the Colonial Office. It is worthy of record that the first three Governors were all Engineers, viz., Sir Harry Ord, Sir Andrew Clarke, and Sir William Jervois.

Clarke's government at Singapore was notable. On his arrival he found everything in the utmost confusion. Piracy was rampant, the native states in the Malay Peninsula in a chronic condition of internecine war, and the powers of the British Government confined strictly to the points under its immediate sway, viz., Singapore, Malacca, and Penang. In a comparatively short time the new Governor changed the whole aspect of affairs. He discovered that by an old Dutch treaty the possessors of Singapore were entitled to a port on the western coast, called Pulo Pankor, so he determined to revive the claim as a vehicle for entering into treaty relations with the neighbouring chiefs. He proceeded to the spot, opened negotiations, and by careful diplomacy eventually succeeded not only in recovering this district but in establishing a British protectorate over the entire Peninsula. Residents were appointed to guide the native chiefs, and by dint of good management peace was restored and trade revived generally. The native rulers were soon led to perceive that their revenues were far more profitable under the new *régime* than they had been when raised by a system of blackmail and warfare.

The exchequer of Singapore was at the same time largely increased by the export and import duties levied at the ports under British control. Such changes as these were not effected without criticism, and a debate arose in the House of Lords, where after much discussion the action of the Governor was approved. Still there was some uneasiness felt at the boldness of the new policy, and Sir Andrew Clarke received a letter from Lord Carnarvon, some parts of which may be quoted to show the fears that were prevalent:—

"Though Friday's mail will take you out a despatch of formal approval, yet I do not like, after what occurred a few days since in the House of Lords, to refrain from adding a few lines privately to assure you of the interest with which I watch your action in the Peninsula. As far as the reports of your proceedings have yet reached me, we have every cause to be satisfied, and I doubt not that all that you will have to tell will be of a like nature. Peace and order, the revival of trade, and the suppression of piracy, must conduce directly to English interests, and I certainly am not disposed to quarrel with an extension of English influence rightly and fairly developed. At the same time, I feel bound to add the caution—though I believe that in your case it is practically unnecessary—that in our present dealings with the Malay States, we are entering upon new ground and relations of a somewhat delicate nature. The history of Indian 'Residents' is too recent and marked not to seem to throw light upon similar appointments in the Peninsula; and it is in fact so much in point, that it ought to put us on our guard in the present instance. Their presence is an undoubted benefit to the Native Court and State; on the other hand we become, through them, con-

nected much more closely than heretofore with things and persons and political combinations that may easily lead us farther than we now intend to go. This new phase, therefore, of Colonial policy needs very careful watching, and I think more by those on the spot, where there is a far greater power of immediate control other than by the Secretary of State in London. I feel sure that I may count upon you—I will not say for yourself or me but—for the great interests which are at stake in this matter, and which would be easily jeopardised by precipitancy or immature ambition, to exercise now as much caution and forbearance as you have shown energy and decision." . . .

The result of Sir Andrew Clarke's policy has proved eminently successful, and although there have been disturbances since, the state of the Peninsula has steadily become more and more satisfactory from the time of its first adoption. In 1875 he was relieved of his Government to proceed to India, there to take up the position of Member of the Supreme Council for Public Works, a new office of which he was selected the first holder. His tenure of that post is chiefly remarkable for the great development of railways and telegraphs which took place under his auspices. These grew to such an extent, that in the last year of his stay in India, no less than 1,000 miles of railway were added to the Indian system. He was the first to urge in Council the necessity of pushing forward our frontier railways, and extending the system through Kandahar to Herat. He had obtained the sanction of the Governor-General in Council to his views, and heavy purchases of rails had already been made in England, when further action was stopped by the Home Government on the ground that the project was "premature." It may be added that he had received the approval of the Ameer of Afghanistan, Shere Ali, to this extension. Had it been carried out when first proposed by Clarke, it is possible that our subsequent complications with Afghanistan might have been avoided. Sir Andrew Clarke was recalled from India to take up the post of Inspector-General of Fortifications.

In 1870 he was appointed, in company with Captain Richards, R.N., to make a careful inspection and report on the Suez Canal. This he did, and the views then expressed have since been fully realized. Whilst holding the office of Inspector-General of Fortifications, he made a further report on the best mode of widening the Canal.

General Sir J. Lintorn Simmons began his Foreign Office service in connection with the Russian War of 1854-5. In the autumn of 1853, he was travelling in Eastern Europe, being on leave from his duties as Secretary to the Railway Commission, under the Board of Trade. At that time Turkey had become

involved with her powerful Northern neighbour. Russia was gradually massing her troops in the Principalities, and the Turks on their side were making preparations for defence on the south of the Danube. Captain Simmons placed his services at the disposal of Lord Stratford de Redcliffe, the British Ambassador at Constantinople, and was by him requested to proceed to the Danube to inspect, and report on the measures that had been taken for the defence of the frontier, and the condition of the Turkish army assembled there under Omar Pasha. This he did, and returning to Constantinople, drew up a statement for the information of the Ambassador.

He was then requested to accompany a party of recently arrived French officers, on a tour of inspection of the defences of the Bosphorus. Whilst engaged in this duty, the Russian attack on, and destruction of, the Turkish fleet at Sinope occurred, and on his return to Constantinople Lord Stratford desired him to take advantage of the sailing of a squadron of the British fleet, under Sir E. Lyons, convoying troops to certain stations on the Black Sea, to inspect the posts of Batoum, Trebizonde, Sinope, and others. Having performed this service, he again returned to Constantinople, where he found himself the only British officer present. Sir John Burgoyne and party had arrived and gone on to Varna. Captain Simmons was preparing to quit Constantinople for England, his leave having expired, when he received an urgent message from the Ambassador requesting his immediate presence. On arrival at the Embassy, Lord Stratford placed in his hands a Russian *Ordre du Jour*, giving the necessary instructions for the passage of the Danube on a certain day, at a point near Galatz. It was most important that this startling intelligence should be placed as quickly as possible in the hands of Omar Pasha.

Captain Simmons undertook the mission, and started that afternoon for the Danube. On arrival at Varna, he took horse and rode to Schumla, a distance of sixty miles, in bitter weather, hoping there to meet the General. At Schumla, he found one of Omar Pasha's Aides-de-Camp about to start for Rustchuk, where his Chief was supposed to be. Although Simmons had been twenty-four hours in the saddle, he joined this officer, two hours after his arrival, for a fresh ride to Rustchuk, and not finding Omar Pasha there proceeded still farther to Tertuchan, and at that place had the satisfaction of placing the important document in the hands of the Turkish General.

It was not a moment too soon: Omar Pasha sent instant orders to the Division of his army stationed at Galatz to retire. The Russians had begun their advance when these orders arrived, and

but for the promptitude and perseverance of Simmons, the Turkish corps would have been annihilated. As it was, two Egyptian regiments were cut to pieces before the retreat could be carried out.

It was now clear that Silistria would be besieged, and Simmons accompanied Omar Pasha to that fortress to advise as to the steps to be taken towards placing it in a state of defence. Whilst still with the Ottoman army, he received a peremptory summons either to return to his duties or to resign his civil appointment and place himself under the orders of Sir John Burgoyne. He felt that to abandon the Turks at that critical moment would be a matter of very serious consequence; he therefore remained where he was, placing his resignation in the hands of the home authorities.

Meanwhile the Russians had invested Silistria, and begun the siege. Omar Pasha was anxious that the garrison should have the advantage of advice from a skilled Engineer, and requested Simmons to proceed thither under the escort of a regiment of cavalry. The Governor of the fortress had been killed, and his successor was directed to accompany the party. It was not an easy matter for so large a body of men to penetrate unobserved through the investing army. Fortunately the Deliorman forest stretched across one side of the line, and as at this part there was a great scarcity of water, no Russian troops were encamped there, the forest being simply patrolled by cavalry. Simmons and the new Governor with their escort succeeded in escaping the vigilance of the scouts, and entered Silistria without coming in contact with the enemy. Once arrived there he took a very bold step. Finding that the fortress was not sufficiently provisioned for the large garrison it contained, he dismissed no less than 5,000 of the Bashi-Bazouks, and the whole of the regiment of cavalry which entered with him excepting one squadron. This, of course, seriously reduced the fighting strength of the defence, but it was absolutely essential to prevent the surrender of the fortress from famine. After having given the necessary orders for the improvement of the fortifications he left the place with his squadron, again succeeded in passing unmolested through the Russian lines, and returned to Omar Pasha, who was with the allied Generals at Varna.

About this time Lieutenant-Colonel Du Plat, R.E., who, until the war broke out, had been Consul-General at Warsaw, was offered the post of British Commissioner with the Ottoman army. He, however, declined the appointment, on the ground that Simmons had been for a considerable time doing the duty in a manner which proved his eminent qualifications to fill the office. Simmons was therefore named Commissioner. He had received the brevet

of Major for his services, and was now given the local rank of Lieutenant-Colonel.

On the raising of the siege of Silistria by the Russians, it was determined that the Turkish army should advance, and cross the Danube in their turn. This was done, and Lieutenant-Colonel Simmons was sent to the front to carry out the construction of defensive works, which would act as a *tête-de-pont* to the bridges that had been thrown across the river. These lines stretched from Giorgevo to Slobodzie. The Turks gradually established themselves in the Principalities, and awaited the further course of events. The allied armies had meanwhile invaded the Crimea, and begun the siege of Sebastopol.

The news of the battle of Inkermann had just been received by Omar Pasha, when a telegram arrived from the Emperor Napoleon to the French Commissioner, couched in the following words: "*Faites tout ce que vous pouvez pour qu'Omar Pasha marche sur le Pruth.*" It must be borne in mind that at this time the telegraphic communication with Paris was not complete, and it was evident that the Emperor, when he sent the message, had not heard of the battle of Inkermann. The French Commissioner urged Omar Pasha to carry out the instructions contained in the telegram; but Colonel Simmons opposed the plan. He pointed out that the allied armies in the Crimea had received a very heavy blow; that they had no reserves nearer than England and France, and that in consequence he thought Omar Pasha should place the Turkish army at their disposal. He carried his point. The General concurred in his views, and sent him across to the Crimea, to offer his troops to the allied Commanders. The proposal was accepted, the Turks were concentrated on Varna, and moved across, some to Eupatoria, and the main portion to Balaklava. Lieutenant-Colonel Simmons was at Eupatoria when the Russians attacked the town, and was present at the battle which ensued. He afterwards joined Omar Pasha before Sebastopol, and was with him when the place fell.

In the beginning of 1856, Omar Pasha sent him on a mission to London and Paris, to communicate his views as to the best method of continuing the war; but on arrival at home he found that the preliminaries of peace were under discussion, and his mission consequently futile. After the conclusion of peace he was named chief Commissioner for the delimitation of the Turco-Russian frontier in Asia, from Mount Ararat to the Black Sea. The other Commissioners under him were Lieutenants C. G. Gordon and E. R. James.

His next appointment was that of Consul-General at Warsaw, which he held for upwards of two years. This was a post that

had been filled for some time prior to the Russian War by Lieutenant-Colonel Du Plat, R.E. The principal duty was to keep a keen watch on the movements of the Russian army.

At that time the only part of the military forces which was in complete readiness for war, then called the Active Army (being, in fact, what is now termed mobilized), was stationed with its headquarters at Warsaw; Prince Gortschakoff, who afterwards conducted the defence of Sebastopol, was in command. Any unusual movement in this army was a sure sign of some impending difficulty, and it was whilst Consul-General that Du Plat was enabled to give the first intimation to the British Government of the threatened attack on Turkey.

The next duty performed by Sir Lintorn Simmons, under the Foreign Office, was to accompany Lord Beaconsfield and the Marquis of Salisbury to Berlin, in 1878, as Military Adviser, during the conference that was held to discuss the treaty of San Stefano, and which culminated in that of Berlin. In 1880 he was again sent to Berlin by Lord Granville, in a similar capacity, to attend the British Ambassador, Lord Odo Russell, who was Commissioner for determining the line of the enlarged boundary of Greece, then under discussion.

In both these Councils the services rendered by Sir Lintorn Simmons were of such a strictly confidential nature, and of so recent a date, that it is not advisable to give any details. It is, however, well known that they were most valuable, and that many important points were determined in deference to his views.

With these conferences his employment under the Foreign Office ceased; but four years later, viz., in 1884, he was appointed Governor of Malta, thus re-establishing a connection with the Colonial Office, which had begun as far back as 1847, when he had been called on to render his assistance in defining the boundary between Canada and New Brunswick. Whilst Governor of Malta Sir Lintorn Simmons introduced the new Constitution given to that island, and brought it into efficient action. This was a great and somewhat difficult reform to carry through. The Council of Government had hitherto been composed of elective and official members in equal numbers, the Governor having the casting vote, thus rendering the official element all-powerful. By the new constitution there were to be fourteen elected, and only six official members, and the vote of the Governor was abrogated. Further than this, the officials were deprived of their votes on all questions of finance. Such a sudden change in the system of government would naturally have led to many complications had not the utmost tact and judgment been shown by the Governor. The drainage and water supply of the island have also been greatly

developed under his auspices. He has only lately been relieved from his post.

General Sir Edward Stanton began his connection with the Foreign Office by being appointed British Commissioner for the delimitation of the Bessarabian Frontier after the Crimean War. He was then sent to Central America, to report upon a project for an inter-oceanic railway through the State of Honduras, at the special request of Lord Clarendon, then Foreign Secretary. He afterwards succeeded Sir Lintorn Simmons as Consul-General at Warsaw. From Warsaw he was sent to Egypt as Agent and Consul-General. His duties whilst in that post threw him greatly into connection with the construction of the Suez Canal, and rendered necessary a strict guard over British interests as involved in that wonderful work. The whole affair of the purchase of the shares now held by the British Government was conducted by Sir Edward Stanton, with whom rests the entire credit of this extremely satisfactory arrangement. From Egypt he was sent to Munich as Chargé d'Affaires in Bavaria, a post which he held for six years, and at the conclusion of which he retired on a Diplomatic pension.

Colonel Sir Charles Warren was selected by Lord Carnarvon in October, 1876, to act as Special Commissioner, in conjunction with a colleague nominated by the Orange Free State, to delimitate the boundary line between that State and Griqualand West. This work involved much delicate and difficult negotiation with the Boers, who were settled along the line of boundary, and who were at the time strongly incensed against Great Britain. Captain Warren succeeded in calming the prevailing irritation, and restoring an amicable feeling. The boundary was traced with the ultimate approval of all interested, and at the termination of the business in May, 1877, he received the thanks of the President and Volksraad of the Orange Free State, and those also of the Legislative Council of Griqualand West. Her Majesty marked her sense of his services by bestowing on him the C.M.G.

In June, 1877, he obtained leave to return to England, through the Transvaal, then newly annexed, and was requested by the High Commissioner, Sir Bartle Frere, to report on the prospects of a railway, then projected from the Transvaal to Delagoa Bay. In company with Mr. Ravenscroft, the Auditor-General of Griqualand West, he passed through the country and walked down from the Gold-fields to Delagoa Bay. He furnished the required report, and an outline of it was read before the Royal Geographical Society. On reaching the latter point Warren found a telegram, requesting him to return to Cape Town instead of proceeding to England, *viâ* Zanzibar, as he had intended. This

change was due to the fact that Sir Bartle Frere wished him to proceed again to Griqualand West, as Special Commissioner, to investigate disputed land claims, which were extremely numerous and complicated. This he undertook with much reluctance, as he could not receive any official position beyond the nominal one of Commissioner. His success, therefore, would entirely depend on his personal influence over the Boers and British colonists. Gradually, he secured the good-will of both parties, and by Christmas, 1877, had settled every claim except two. Details of this work are given in a Blue Book, "Report on the Land Question of Griqualand West," published by the Colonial Office, in June, 1880.

In January, 1878, on the outbreak of the Kaffir War, Captain Warren, in consequence of his success in dealing with the Boers and mining population of Griqualand West, was appointed to the command of the Diamond Field Horse, with the local rank of Lieutenant-Colonel. He marched the regiment from the Diamond Fields to Kaffraria, a distance of 500 miles, and was engaged with them in numerous actions during February and March. In a General Order, dated March 4th, 1878, Lieutenant-Colonel Warren and his corps were specially thanked for their services on the Frontier. Commandant Brabant having met with a serious reverse on Buffalo Range, on March 17th, Warren led a dismounted detachment of his force through the Pine Bush, then in possession of the Kaffirs, and proceeded to his assistance. During this critical operation he received a severe injury in the back, through the fall of a tree, notwithstanding which he continued in command, and succeeded in bringing the troops through the enemy's lines.

He commanded the force in the successful action of Deh Nek on April 5th, when, with seventy-five mounted men, he attacked in the open a body of Kaffirs, 1,800 in number, and completely routed them in a hand-to-hand engagement. The success of this combat prevented the intended rising of the tribes west of King William's Town.

Warren was now placed in command of the entire column, and was repeatedly engaged. On May 15th he was directed to proceed by forced marches to the relief of Colonel Lanyon, who was besieged on the Orange River. This was accomplished, and at the termination of the campaign he received the brevet of Lieutenant-Colonel, having been several times mentioned in despatches, thanked in General Order of May 14th, and recommended specially in the final despatch of June 26th, for having prominently distinguished himself during the war.

The services which he performed in the Griqua and Bechuana campaigns in 1878-9 are best told in the following letter addressed by the Colonial Office to the War Office, dated December 27th, 1879 :—

"I am directed by the Secretary of State for the Colonies to request that you will bring under the notice of Secretary Colonel Stanley the reports as noted in the margin in the accompanying Blue Books, shewing the military services rendered by Lieut.-Col. Warren, R.E., C.M.G., after his return to Griqualand West, from the Gaika War in June, 1878. Until August, 1878, Colonel Lanyon appears to have remained in the field; but Lieutenant-Colonel Warren, though not occupying a higher position than that of Chief of Colonel Lanyon's Staff, appears to have, in fact, acted to a great extent independently and not under his immediate supervision, and when, at the close of the engagement of the 18th June at the Paarde Kloof, Colonel Lanyon arrived with the Southern Column, he left Lieut.-Col. Warren in Command to complete the victory" (Warren had up to that moment been only in command of the northern column), "considering that the entire credit of the brilliant success then attained was due to Lieut.-Col. Warren. In the operations at Kuruman and the capture of Lakato, Lieut.-Col. Warren not only behaved with dashing personal bravery, as on previous occasions, but contributed materially to the success of an operation which, in many particulars, clearly resembled those just concluded against Morosi's Mountain and Sekukuni's Town. In September, 1878, Colonel Lanyon being fully occupied with the civil duties of his office, despatched Lieut.-Col. Warren in independent command of a Colonial force organized by him, to operate against a combination of Griquas, Korannas, and Bechuanas, who were assembled at the Makolokues mountain on the confines of the Kalihari desert, and were threatening the colony with invasion. It will be seen from the reports that Lieut.-Col. Warren had here again to deal with the problem of capturing a fortified mountain, which has proved so difficult in recent South African warfare, and he effected his object by a brilliant strategical movement, taking the enemy in reverse and driving them at once from their most formidable lines of defence; the work of clearing them from the Krantzes in which they subsequently took up position, being successfully effected in the same day. In January, 1879, Lieut.-Col. Warren succeeded Col. Lanyon in the Civil Administration of Griqualand West, but still retained the military command in the province, and to the North and North-West beyond the Provincial Border, the details of which are shewn in the reports now enclosed. Not only were Lieut.-Col. Warren's military operations successful throughout, but they were accompanied by a large measure of political success; his tact, humanity, and moderation in victory having done much to convert our enemies into friends, and to promote the permanent pacification of the districts to the north of the Orange River over which our influence extends. Lieut.-Col. Warren has already been rewarded for his services in the Gaika

war by the brevet of Lieutenant-Colonel, but his subsequent services in Griqualand West form a distinct and very creditable episode in the history of the recent South African warfare, for which Sir Michael Hicks Beach hopes he may be considered entitled to fresh recognition in the form of the brevet of Colonel, or such other mark of approbation as Colonel Stanley and His Royal Highness the Field Marshal Commanding in Chief may think proper to recommend. The operations of 1878-9 throughout South Africa should be regarded as a whole, and Sir Michael Hicks Beach trusts that officers of the Regular Army who have organized and led to victory the Colonial Levies in separate command, may be thought not less deserving of the usual Military rewards than officers who have served under the immediate direction of the General Commanding in Chief in heading Her Majesty's regular troops; indeed, officers of the former class have some special claims to consideration, on account of the difficulties which they have had to overcome; and in organizing not only a combatant force, but also the Transport, Commissariat, Pay and Hospital Departments of that force, Lieut.-Col. Warren displayed a general knowledge of his profession, which marks him as an especially intelligent and valuable servant of the Queen. In these circumstances Sir Michael Hicks Beach trusts, that the strong recommendation which he now makes of the grant of the Brevet of Colonel to Lieut.-Col. Warren may be successful." (Signed) "E. Wingfield."

This letter, strongly worded as it was, brought no result, and Warren did not receive any further promotion or reward for these brilliant services. He was next engaged in the search expedition after Palmer, Gill, and Charrington, in the Egyptian Desert. This difficult task he brought to a successful issue, tracing the murderers and bringing them to condign punishment. For this he was rewarded with the honour of K.C.M.G. in 1883.

In 1884 he was placed in command of a strong military force, to proceed to Bechuanaland to put down disturbances there. He was at the same time appointed Special Commissioner to conduct the civil government of the country. His military work in this campaign has been detailed in Chapter XXIV., Part I. His civil administration was but short-lived, as he was recalled owing to differences with the High Commissioner. The ovation which awaited him on his return to Cape Town marked the opinion of the colonists in this dispute. He received the G.C.M.G. for this expedition.

Major-General C. G. Gordon had but a brief connection with the Colonial Office when, in 1882, he accepted a post at the Cape which placed him at the head of the Colonial forces, a position which he occupied a very few months. He soon felt called on to resign it, owing to the policy of the Cape Government towards the natives, which was such that he could not concur in it.

Having returned home, and being available for further govern-

ment service, it was only natural that the eyes of those in power should be directed towards the man whose career in dealing with semi-civilized tribes had for so many years proved brilliantly successful.

As early as December 1st, 1883, Lord Granville had telegraphed to Sir Evelyn Baring to know whether if Gordon were willing to go, he would be "of any use to you or to the Egyptian Government, and if so, in what capacity." The offer was declined on the ground that the rising in the Soudan was a religious movement, and would be aggravated by placing a Christian in high command there. This view was apparently abandoned shortly afterwards, as on January 16th, 1884, Sir Evelyn telegraphed that the "Government would feel greatly obliged if Her Majesty's Government would select a well-qualified British officer to go to Khartoum instead of the War Minister. He would be given full powers, both civil and military, to conduct the retreat." At the same time he suggested that Gordon would be the best man for the post. The result of this telegram was a letter from Lord Granville to General Gordon, dated Foreign Office, January 18th, which ran as follows:—

"Her Majesty's Government are desirous that you should proceed at once to Egypt to report to them on the military situation in the Soudan, and on the measures which it may be advisable to take for the security of the Egyptian garrisons still holding positions in that country, and for the safety of the European population in Khartoum. You are also desired to consider and report upon the best mode of effecting the evacuation of the interior of the Soudan, and upon the manner in which the safety and the good administration by the Egyptian Government of the ports on the sea coast can best be secured. In connection with this subject you should pay especial consideration to the question of the steps that may usefully be taken to counteract the stimulus which it is found may possibly be given to the slave trade by the present insurrectionary movement, and by the withdrawal of the Egyptian authority from the interior. You will be under the instructions of Her Majesty's Agent and Consul-General at Cairo, through whom your reports to Her Majesty's Government should be sent under flying seal. You will consider yourself authorised and instructed to perform such other duties as the Egyptian Government may desire to entrust to you, and as may be communicated to you by Sir Evelyn Baring. You will be accompanied by Colonel Stewart, who will assist you in the duties thus confided to you. On your arrival in Egypt you will at once communicate with Sir Evelyn Baring, who will arrange to meet you, and will settle with you whether you should proceed direct to Suakin, or should go yourself, or despatch Colonel Stewart to Khartoum *viâ* the Nile."

At the same time Lord Granville addressed the following despatch to Sir Evelyn Baring.

"I enclose herewith a paper containing some suggestions made by General Charles Gordon as to the steps which should be taken with regard to the present state of affairs in the Soudan. Her Majesty's Government have not sufficient local knowledge to enable them to form an opinion as to the practicability of these suggestions, and I therefore authorise you, as time is valuable, either immediately to make the arrangements suggested, or to await General Gordon's arrival and consult with him as to the action to be taken.

Gordon's proposals were meanwhile telegraphed out to Baring, and the latter replied by wire :—

"All Gordon's suggestions are excellent, and quite in harmony with the lines on which we have been working. A message was sent by the Khedive somewhile ago to the leading men at Khartoum, which was in the sense, and almost in the words, suggested by Gordon. I think that he had better go by the valley of the Nile, and not by Suâkin."

The tale of Gordon's journey to Khartoum, his labours whilst there to carry out the policy with which he was entrusted, and his tragic fate after months of weary waiting and suspense, will be found in his biography, and need not be repeated here.

The Afghan Boundary Commission was not placed under the control of the Royal Engineers. Still, as they formed a very important element in it, some allusion should be made thereto. This Commission was a natural outcome of the Afghan War, and the new position taken up by the British Government in the affairs of that country.

As it had been determined that a boundary should be delimited on the north, to avoid, if possible, further disputes with Russia, and to mark the line where the influence of the two countries should respectively terminate, a Commission was nominated to act in conjunction with a similar body on the part of Russia. Sir Peter Lumsden was placed at its head, and the Engineer members were Captain Peacocke for Intelligence duties, and Majors Strahan and Holditch, Captain Gore, Lieutenants the Hon. M. G. Talbot and Wahab, for Survey duties. The manner in which the work was performed by these officers is well shown in the following extract from Lieutenant Yates's "Travels with the Afghan Boundary Commission," pp. 425, 426 :—

"To begin with the Intelligence department, it was represented by Capt. Maitland, B.S.C., and Capt. Peacocke, R.E. Their great work was to explore the routes between Nushki and the Hélmund. . . . . Throughout the march of the Commission to Kuhsan both officers were diligently engaged in collecting all information possible of military import about the country traversed. During the winter of of 1884–85 they explored most of the routes in Badkis, and in the country from Maruchak on the Murghab to Kilif on the Oxus, including the khanates of Maimena,

Andkhui, Akcha, and Shibargun. When, in the summer and autumn of 1885, explorations were recommenced, Capt. Maitland travelled from Herat through Obeh and Daulat-yar to Bamian, thence through the difficult passes of the Hindu Kush to Balkh, and back viâ Maimena to rejoin the Commission at Chahar Shambu in January. He was accompanied throughout by Capt. the Hon. M. G. Talbot. Capt. Peacocke, in the meantime, was busily engaged in superintending the improvement of the defences of Herat, and on the completion of that duty was employed, throughout the winter of 1885–86 and spring of 1886, in assisting to make the surveys necessary for the demarcation of the frontier from the Hari Rud to the Oxus. . . . . The work of the Survey department, included almost all western and northern Afghanistan. But, in addition to that, Captains Gore and Talbot surveyed Khorasan, east and south-east of Mashad. All three officers of the Survey Department, Major Holditch, Capt. Gore, and Capt. the Hon. M. G. Talbot, being Royal Engineer officers, were members of the committee that reported on the defences of Herat, and the measures necessary to place them in a satisfactory condition. . . . The surveys required for the frontier demarcation were all executed by the three officers above mentioned, and their subordinates, assisted by Captain Peacocke, and very hard work it was."

In addition to those already referred to, the following officers of Royal Engineers have been Governors of colonies, viz. :—

Sir Charles Felix Smith, Trinidad, from 1828 to 1831.

Sir James Carmichael Smyth, British Guiana, from 1833 till his death in the colony in 1836.

Sir George Gipps, New South Wales, 1838 to 1846.

Captain R. C. Moody, Falkland Islands, 1842 to 1848.

Sir Harry Ord, Lieutenant-Governor of Dominica from 1857, to 1860; Governor of Bermuda, 1861 to 1863; Straits Settlements from 1867 to 1873, and Western Australia, 1877 to 1880. He was also Special Commissioner on the West Coast of Africa in 1864.

Sir Frederick Chapman, Governor of Bermuda, 1867 to 1870.

Sir William Jervois, Straits Settlements, 1875 to 1877; South Australia, 1877 to 1882; New Zealand, 1882 to 1888.

Lord Napier of Magdala, Gibraltar, 1876 to 1882.

Major-General Laffan, Bermuda, 1877 to 1882.

Major-General Gallwey, Bermuda, 1882 to 1888.

Lieutenant-Colonel Blount, St. Helena, 1886.

The Government of India has always employed its Engineer officers very freely, not only in civil works of a professional character, but also politically. It would be almost impracticable to give a detailed list of the various appointments that have thus been filled, but the following may be taken as specimens of the posts held by them at various times :—

General Sir William Baker was for some time Military Secretary

at the India Office, and afterwards became Member of the Council of India.

General John Reid Becker was in administrative employment for many years in the Punjab as Deputy-Commissioner and as Commissioner. His last appointment was as Commissioner of the Peshawur Division.

Lieutenant-General George Chesney has been Secretary to the Government of India in the Military Department, and is now Military Member of Council of the Governor-General.

Major-General Sir Henry Durand has held various appointments, which will be found detailed in his biography.

Lieutenant-General George Hutchinson was head of the Police Department in the Punjab.

Major-General Edward Lake was Deputy Commissioner, then Commissioner, and finally Finance Commissioner in the Administration of the Punjab.

Lieutenant-General W. J. Marriott was Secretary to the Governor of Bombay in the Military Department.

Lieutenant-General Sir T. T. Pears was Military Secretary at the India Office.

Lieutenant-General Sir Richard Strachey was Secretary to the Government of the North-West Provinces, and afterwards Member of Council for India. He was sent on a special mission to India when he was made President of the Famine Commission and Member of Council of the Governor-General. On his return to England he was re-appointed Member of Council.

Colonel H. Yule was appointed in 1855 Secretary to Major Arthur Phayre, on his Mission to the Court of Ava. He is now Member of Council for India.

Field-Marshall Lord Napier of Magdala was Military Member of Council of Governor-General.

Lieutenant-Colonel Hugh Fraser was Chief Commissioner of Agra and North-West Provinces.

Lieutenant-Colonel N. C. Macleod was Military Secretary to the Lieutenant-Governor North-West Provinces.

Colonel Sir O. B. St. John was Resident in Kashmir, and Governor-General's Agent at Baroda.

Major-General Sir H. Prendergast is Resident at Mysore, and Chief Commissioner of Coorg.

Lieutenant-General C. W. Tremenheere has been Political Agent at Aden.

Lieutenant-Colonel H. Trotter is Military Attaché at Constantinople under the Foreign Office.

There yet remains another list of Engineers who have performed notable service within the last few years, not rightly to be ranked

under either of the foregoing heads, namely those attached to the Egyptian Government.

Colonel Sir C. Scott Moncrieff, with his assistants, Lieutenant-Colonel Western, Major Ross, and Major R. H. Brown, have had the control of the irrigation works.

Colonel Chermside was for a long period, during the most critical portion of the late war in Egypt, Governor-General of the Red Sea Littoral, and when he left that post to become Her Majesty's Consul at Erzeroum, it was filled by Colonel Kitchener, who held it until appointed Adjutant-General of the Egyptian Army. In this position he has commanded a Brigade under General Grenfell in the recent attack upon the Arabs outside Suakin. Kitchener and Chermside, although still only Captains in the Corps, are both Colonels in the army, having gained that grade entirely by the services they have rendered in Egypt. Major Settle is Surveyor-General in the Egyptian army, adding yet another to the long list of Engineer officers who have filled with distinction posts unconnected with their own branch of the army. He also has acted as Chief of the Staff in Grenfell's expedition.

CHAPTER VI.

Irish Governmental Work.

The two Under Secretaries—Drummond's measures—Larcom's work—Burgoyne appointed Chairman of Board of Public Works—Duties of the Board—Shannon Improvement Works—Railway Commission and its Report—Proposed State Assistance—Burgoyne succeeded by H. Jones as Chairman of Board of Works—Irish Famine in 1846—Commission for its Relief—Foster as Commissioner—Harness on Special Duty—McKerlie succeeds him and becomes Chairman—County Relief Works in 1879-80—Engineers employed—Sankey succeeds McKerlie—Sir Atwell Lake appointed Chief Commissioner of Dublin Police.

Not the least interesting branch of the services performed by officers of the Royal Engineers, has been their political connection with Ireland. This was one of the results of the Irish Ordnance Survey. The men who carried out that magnificent work were much thrown with the people, and had opportunities afforded but to few for studying their characteristics, their instincts, and their wants. Fortunately several among them were not slow to take advantage of the position. At that time much change was arising as to the spirit in which Ireland was to be governed. Before the Catholic Emancipation Act was passed, there is no doubt that the system adopted had been purely based on the Protestant ascendancy. The laws were made for the benefit of the minority, which was left to control the great majority of the country very much at its will. Now all this was to be altered, and the new plan was to be one in which the interests and the wishes of the whole population were to be consulted.

"It was to be a firm and enlightened policy suited to Irish wants, but administered on English ideas. All agreed on this point, Whigs and Tories alike. Impressed with this spirit, the Government took pains to seek out agents who could be trusted to create and deal with the new organisations, and into the hands of those agents the permanent and practical administration of Ireland fell. The first of these was Captain Drummond, the second, the late Sir Thomas Larcom. The interval between 1840, when Drummond died, and 1853, when Larcom succeeded to his place, though worked on the same lines, was scarcely so successfully worked, and thus the distinction generally accorded to these two

remarkable men is the more emphasised. Both were Engineer officers. That splendid corps had only recently been brought to the perfection of mingled scientific and military accomplishments, by the agency of the great men produced in the war. With the peace a pacific field was found for their abilities in the Ordnance Survey of England and Ireland, in the service of which both Drummond and Larcom made their fame. This union of military and civil training was precisely what the ordinary administrator could not be expected to possess. It only required the addition of official experience and loyal support from the responsible heads of departments to make it a perfect agency. Though neither of them was Irish by birth they both became 'Hibernis ipsis Hiberniores.'"*

Much of the machinery by which Ireland has since been governed was created by Drummond. The system of stipendiary magistrates was introduced by him, as were also the Royal Irish Constabulary and the Dublin Metropolitan Police Force. As regards the constabulary, before Drummond's time it had been simply a county police under the control of the justices of the peace. He consolidated and brought it under the direct orders of the Castle. These changes were at the time, and for many years after, most popular in the country. A firm centralized government and a paid magistracy, which might be trusted to administer justice without the partiality too often shown by the local authorities, were what the people desired. As Larcom wrote in one of his statesmanlike memoranda:—

"They everywhere mistrusted one another, and they were all satisfied with whatever Government" (meaning the Castle) "decided." And again, in another paper, "applications for the attendance of the stipendiary magistrates still continue to show the greater confidence that is placed in them by the poorer class. Local government is still, to some extent, considered to be the handing over of one party to the tender mercies of another, and when both parties concur in wishing for it on any particular occasion, or in any particular institution, it is to be feared it only proves that each thinks itself strong enough to get the upper hand. So long as this feeling continues the direct action of Government can scarcely be dispensed with, whether that action is exercised from Dublin or London."

These are weighty words, written by one who had made the government of Ireland his study, and recent events have by no means shorn them of their importance. It is a curious fact that the sentiments of the two men, Drummond and Larcom, seem to have been somewhat contradicted by their action. Drummond was universally looked on as having leant towards national sympathies, to have felt much of what is now called Ireland for the Irish, and

* "Edinburgh Review," No. 336, p. 455.

his celebrated sentence, "Property has its duties as well as its rights," was at the time thought almost revolutionary. Yet he it was who by his acts brought the centralization of Castle control into full vigour, and threw cold water on all that savoured of local government. Larcom, who only carried out the system introduced by Drummond, and that as tenderly as was consistent with its just exercise, was always considered the stern legislator. "Larcom and the police" became a by-word, whilst Drummond was a popular hero, and his death mourned as a national calamity.

Looking back on the two men's work, who can doubt that Larcom really did the most, and in his day was the most successful? It is difficult, in the present turbulent condition of the country, to remember that during the years when Larcom ruled, the bulk of the people were contented, and desired nothing better than firm and impartial government. Drummond was the man of genius, Larcom the man of work, and they have both left behind them an Irish reputation which is cherished in the Corps with much pride.

Larcom has himself given a brief epitome of some of the more important work carried out under his auspices :—

"Advancing society required new establishments. The state of Ireland year after year engrossed the attention of Parliament. Tithes and Church temporalities, reform, parliamentary and municipal, were in succession provided for by legislation. Education was the next great measure, then public works, the railway commission, harbours, navigation, and extensive river works like the Shannon, Corrib and the Bann, with general and local drainage. Many other physical enlargements of industry evinced the energy and activity of the Government, in bringing Ireland forward to the level of the sister-country more rapidly than local or individual efforts could have done. Next, the poor law provided and regulated a system of legal charity in food and shelter, and subsequently in medical relief. Then the famine tested and strained to the cracking-point the new institutions and the social condition of the country. It enlarged the poor law, and introduced the Encumbered Estates Courts; more and better than all, the famine left behind it a conviction of the necessity for self-dependence and local self-government. Various minor institutions, hospitals, asylums, convict systems, and other establishments have all been remodelled and reformed . . . . Contrast the Ireland of to-day (1858) with that of fifty years ago, depicted, *e.g.*, in the Duke of Wellington's Correspondence, and in the difference read the effect of the care and influence of the mode of government which has effected it."

It has already been said that Larcom became Under-Secretary in 1853, whilst most of the work above enumerated had been set in motion some years before. Still it was he who to a great extent was the creator of the movement. He was taken into the Irish

Civil Service as Commissioner of Public Works in 1846, and before he was fairly established in his new post, the fearful Irish famine burst forth in all its miserable intensity. He was afterwards placed, in 1848, at the head of a Commission of Inquiry into the Poor Law, and also of another for the Reform of the Dublin Corporation. In 1850 he was made Deputy Chairman of the Board of Works. He, therefore, had much to say on all that concerned the internal government of the country, and had thoroughly made himself master of its wants and necessities before he was placed practically at the head of the Government in 1853. On this occasion the "Freeman's Journal" of January 29th, 1853, wrote:—

"The appointment of Major Larcom seems to savour of the same spirit in which the late lamented Capt. Drummond was appointed. Long connected with the country, intimately acquainted with the condition of the people, favourably impressed with regard to the history and antiquities of the country, thoroughly informed on all that relates to the statistics of its agriculture, its commerce, its trade, and its manufactures, capable of originating, and equally capable of completing plans for the development of the resources of the country, with all of which he is acquainted. Major Larcom's appointment is one of which the Government may justly feel proud."

This sketch of Larcom's work cannot be better concluded than by a quotation from a letter of Lord Mayo written in 1868:—

"I have served as the colleague of Sir Thomas Larcom for nearly four years. I cannot express too strongly the sense I entertain of the magnitude of the public service which, as Under-Secretary for Ireland, he has for many years performed. Ever zealous and laborious, calm in danger, cautious and courageous, he has been in troublous and anxious times the mainstay of the Irish Government. His extraordinary knowledge of the country, of her past history, her present system of administration, and of the habits and feelings of all classes of the people, joined to his most remarkable ability, enabled him, though not without intense labour, to discharge duties more important and more responsible than can of late years have fallen to the lot of any other member of the permanent Civil Service of the Crown."

In the above sketch of Drummond and Larcom in their position as Under-Secretaries, allusion has been made to many of the works carried on in the country for the development of its resources. In all of these the Engineers bore a very important and leading part, which it will be well here to specify. The first step in this direction is to be traced to the following letter written to Colonel Burgoyne, R.E., by the Right Hon. Edward Stanley, afterwards Lord Derby and Prime Minister:—

"Whitehall Yard, April 15th, 1837."

"My dear Burgoyne,

"It is some time since you and I have had any communication, and I now write to you in the strictest confidence on a subject to me of no little interest. I do not know whether you are aware that measures are in progress for appointing a board consisting of a president and four commissioners to superintend the application of £500,000, by way of loan for public works in Ireland. The board, however, will be permanent, inasmuch as the sums repaid are intended to be re-invested in a similar manner, and independently of this continued employment, it is proposed to put under the control of this board the existing Board of Inland Navigation, which has the control of the post roads of Ireland, and the Board of Public Works in Dublin, so that we shall furnish abundant occupation for our commissioners. The salaries proposed are from £800 to £1,000 for the president, and £500 each for the junior members, whether with or without a house (other than for the business of the offices) I cannot say. Now, my object in writing to you is to ascertain from you whether the situation of president of this board, for which it is extremely desirable to have an Engineer officer, and for which I should personally prefer you to any other person I can think of, would be acceptable to you, or whether it would be worth your while to take it, because, though I cannot positively say I have it to give—the disposal of it being in the Treasury—I am sure my recommendation would, in your case especially, be attended to. Your friend Gosset will be very glad to have you in Dublin. We have both looked to you in many of our plans for Ireland. Let me know what you think of this, and whether I shall send you more specific information to make up your mind. If the situation should not suit you, perhaps you could name some officer of Engineers whom you could completely rely on, and to whom it might be an object. Determined honesty and decision to check all *jobbing* (no very easy task in Ireland) are the first requisites. Let me hear from you soon.

(Signed) "E. G. Stanley."

This offer was accepted by Colonel Burgoyne, who may thus be considered, as it were, the father of that body of Engineers who have since devoted their talents, energy, and integrity, to the Civil Service of Ireland. The Board of Public Works, of which Burgoyne became the first Chairman, was created under the powers given by the Act of 1 and 2 William IV. c. 33. Two Commissioners were appointed under him, and this body at once took over the duties of five existing boards which were dissolved. These five had been established for the following purposes:—First, to supervise the expenditure of loans from the Consolidated Fund; second, the improvement of Inland Navigation, with Roads and Canals; third, the Dublin Board of Works; fourth, that for Kingstown Harbour; and fifth, that for Dunmore Harbour.

The old Boards thus suppressed had been to a great extent carried on by unpaid Commissioners, and the loose and irresponsible methods natural to such a system had led to much jobbery, peculation, and inefficiency. Moreover, although of the thirty-three commissioners of whom these boards were composed, twenty-eight were unpaid, still the expenses attendant on their establishments and staff were very great. Colonel Burgoyne, shortly after having established the new Board of Public Works on a thoroughly satisfactory basis, drew out a memo. as to the relative expense of the two systems, by which it appears that the former cost upwards of £10,000 to conduct, whilst the charge for the latter was little over £5,000.

The first and most important duty of the new Board was the more efficient managment of the various loans for public works. Under the old system the Commissioners, being unpaid, naturally performed their duties in a very perfunctory manner, the real business to a great extent falling into the hands of the secretaries, and other paid officials. Under the new Board a proper supervision was exercised by the Commissioners themselves. The same people were on constant duty, and having been selected from their fitness for the purpose, afforded to the Government and other parties interested a full security that the money advanced was properly expended. By degrees, as this fact became more and more evident, fresh duties were laid on them. By a series of Acts passed between the years 1831 and 1844, the following additional powers were vested in them, viz., the superintendence of the harbours of Howth and Donaghadee, the district lunatic asylums, the Shannon navigation, the Irish fisheries, the appointment of county surveyors under the Grand Jury Act, and finally the Drainage Commission.

Of these the most important was the Improvement of the Shannon Navigation. The result of the investigation and reports of Burgoyne's Board on the capabilities and neglected condition of this noble river, was that a Select Committee of the House of Commons sat on the subject in 1833. The recommendations of this Committee were eventually carried into effect, in 1837, by the issuing of letters patent to Colonel Burgoyne, R.E., Colonel Harry D. Jones, R.E.,* and Richard Griffiths, Esq., appointing them Permanent Commissioners for the Improvement of the Navigation of the Shannon. This body made a series of most able reports, which were printed and laid before both Houses of Parliament, and in consequence of which loans for the purpose were granted, and the proposed works carried out under their supervision.

* Col. H. D. Jones was at this period already employed in civil duties as a Seconded Officer, being a Commissioner for Municipal Boundaries in England.

On October 20th, 1836, another Commission was nominated "to consider and report upon the principal lines of communication in Ireland, with reference to the comparative advantages and facilities they afford for the construction of railways." This was renewed in the following year on the accession of the Queen. At the head of it was placed Mr. Drummond (late Royal Engineers), the Under-Secretary of State, and with him were Colonel Burgoyne, R.E., Mr. Peter Barlow, professor of mathematics at the Royal Military Academy, Woolwich, and Mr. Griffith. Major H. D. Jones, R.E., was named Secretary, and Lieutenant Harkness, R.E., attached for the purpose of analyzing and condensing statistical information. The work thrown upon this body was very severe, and long continued. Indeed, to it has always been attributed the premature death of its Chairman, Mr. Drummond, whilst at the zenith of his fame, and in his full career of utility as a public servant. The report when completed and issued was universally considered one of the ablest State Papers ever penned. Professor Barlow has given full information as to the original authors of the various parts of this report.

The first three Chapters, viz., those on the distribution and employment of the population, the nature and amount of the present traffic, and the existing public conveyances, were from the pen of Drummond, the returns on which they were based being prepared by Lieutenant Harkness, R.E. The fourth Chapter, on the Geology of Ireland, was by Mr. Griffith. The fifth, headed "Selection and Description of certain Lines of Railway which, from a consideration of the various circumstances above enumerated, appear best calculated to prove beneficial to Ireland, and to afford the greatest return on the capital expended," was the joint production of Colonel Burgoyne and Mr. Griffith. This Chapter was, from its nature, the most important of all, as it contained the gist of that for which the Commission had been framed. The second part of the report, on the cost of construction and maintenance of the railways, was by Professor Barlow. In the third part the first two Chapters, on Steam Navigation, were also by Professor Barlow. The third chapter, on projects for effecting the most rapid communication between London and Dublin, was by Colonel Burgoyne. The remainder of the report, on the present condition of the population of Ireland, and on the influence of railways in developing the resources of the country, was written by Drummond, from drafts drawn up by Colonel Burgoyne and Professor Barlow.

This able document came before the public at a time when the railway mania was just beginning to develop itself, viz., in July, 1838, and it met with the most violent opposition. The ground taken in it was that Irish railways would not prove remunerative

for private speculation if left in the hands of a number of joint-stock companies; that unless some general scheme were adopted, so as to ensure the less profitable lines being made at the same time as those more likely to pay good dividends, the latter only would be constructed, and the benefits of a well-devised complete project lost. It was, therefore, proposed that the entire system should be carried out by public funds, and this principle was adopted by the Government. In the session of 1839, a bill was brought in for the purpose, and a commencement was to be made by a line from Dublin to Cork, at a cost of two and a-half millions, the money to be raised by Exchequer bills, and the line executed under the supervision of the Board of Public Works. Sir Robert Peel led the opposition to the measure, which, nevertheless, was supported by a majority in the House of Commons. A change of Ministry, however, occurred, and the bill never became law.

In 1841 a fresh bill was brought in on very similar lines, in which it was specified that the works were to be executed under the direction of Major-General Sir John Fox Burgoyne, Richard Griffith, Esq., and Colonel Harry D. Jones. This bill was also lost, and the Irish railways fell into the hands of private companies, with a result fraught with pecuniary loss to most of the shareholders, and a want of that general homogeneity in the system which the original scheme of Drummond's Commission would have afforded.

It may here be recorded, as showing the estimation in which the Chairman of the Board of Public Works was held, that Lord Monteagle, on resigning the post of Chancellor of the Exchequer, in 1839, wrote most strongly to Colonel Burgoyne on the subject, as the following extract will show:—

"There are very few acts of my public life which I look back to with such unmixed satisfaction as the formation of your establishment. I suggested the plan in the report of 1830, and drew up every word of your original bill myself But the success of the measure we owe to the selection of one to be the head of the office who entered into the discharge of his duties with a just conception of what those duties were, and with a *rational enthusiasm* that would enable him to overcome the many obstacles which have stood in his way. All this you have done and have besides won and *wore* (though not wore *out*) the confidence of all parties." . . . .

In 1845 Sir John Burgoyne resigned his office as Chairman of the Irish Board of Public Works, and the post was given to Colonel H. D. Jones, R.E., who, after having been recalled to military duty in England for a short time two years previously, had resumed

his position as a Shannon Commissioner. In the following year Colonel Larcom, R.E., was appointed a Commissioner under Colonel Jones, and eventually became Deputy Chairman. In 1846 the Irish famine declared itself, with all its attendant horrors. The failure of the potato crop had been so general, and the dependence of the population on that esculent for their principal food so complete, that it became evident most strenuous measures would have to be taken to rescue the people from absolute starvation. During the session of that year Parliament had granted a large sum of money to be devoted to the employment of the destitute in public works, and, in order to ensure the proper application of this fund, and of such further grants as might become necessary, a special Commission was nominated, with extensive powers to deal with the question. Major-General Sir John Burgoyne, then the Inspector-General of Fortifications, was appointed President, the members being the Under-Secretary, Mr. Thomas Redington; the resident Poor Law Commissioner, Mr. E. T. Twistleton; the Chairman of the Board of Works, Colonel H. D. Jones, R.E.; the Inspector-General of the Constabulary, Colonel Duncan McGregor; and the head of the Commissariat Department in Ireland, Sir Randolph Routh.

The selection of Sir John Burgoyne as the President of this most important Commission was due to the great confidence reposed by the Government in his powers of administration, which is shown by the following letter addressed to him by the Chief Secretary :—

"My dear Sir, "Irish Office, January 26th, 1847.

"I cannot help writing to you to say with how much pleasure I heard from Lord John Russell that you had consented to go to Ireland in the present distressing circumstances of that country. I am sure that your assistance to the Lord Lieutenant at this juncture will be productive of the best results, and your name will inspire more confidence and respect than that of any other man who could have been selected for the difficult task which you have undertaken. In common with every other member of the Government, I am fully sensible of the obligations which both the country and we are under to you for the sacrifice of personal comfort which you have made for the public good. I hope to have the pleasure of seeing you before your departure.

"(Signed) H. Labouchere."

The work of this Commission was enormous. At the height of the famine over three million rations were issued daily. In order to carry out this stupendous amount of relief the country was divided into 1,826 districts, each having its special Relief Committee, and attached to each was a paid employé of the Board, with the title of Inspecting Officer. Of these the following eight

were officers of Royal Engineers—Captains Broughton, Dill, Gallwey, and Ogle, and Lieutenants Baillie, Miller, Menzies, and Inglis.

In order to prevent, as far as possible, the pauperizing of the people which a system of free aid would very shortly have engendered, all the able-bodied men were called on to give their labour in Relief Works, which were to be as far as possible utilitarian. As, however, it was practically impossible to provide what could really be considered reproductive objects of labour within a reasonable distance of the various centres of relief, it was eventually found advisable to employ the people on the making and improvement of roads. Those who, like the writer, were called on to travel much in the rural districts of Ireland at that melancholy epoch, will remember the constant dangers of locomotion caused by the innumerable cuttings and embankments in progress in all directions and on every road. The provision of labour was naturally the first consideration; the utility of the work was only secondary: still, with all its defects, and they were patent and glaring, the system was the best that could possibly have been devised, considering the urgent necessity for prompt action and the universality of the requirements.

In spite of the most active exertions of the Inspecting Officers, fraud and peculation were rampant, and it was found most difficult to ensure that relief was applied only to deserving applicants. Colonel Wrottesley, in his Life of Sir John Burgoyne, quotes some amusing instances of this as furnished to Sir John from the Inspecting Officers:—

"At E——, several tenants of one of the Finance Committee, holding land and stock, and their last half-year's rent paid, received rations with his knowledge."

"At K——, the Inspecting Officer himself struck off 363 daily rations from the lists of one Committee, and 260 from another. Among the former the families of the coachman and gardener of a Justice of the Peace, and among the latter all the labourers of the Vice-Lieutenant of the County."

"At B——, the Chairman of the Relief Committee directed provisions to be issued from the stores of the Committee for his own labourers."

"At C——, a Poor Law Guardian and one of the Committee directed a watch to be kept over eleven bags of biscuit for a night. The watch consisted of himself, his son, a brother, and a son-in-law, who in the morning voted themselves one bag of biscuit (112 lbs.) for their night's service.

Sir John Burgoyne, in a letter to the Master-General, gives a graphic account of his difficulties, of which the following are extracts:—

"From the composition of this Commission, every other member being deeply charged with heavy departmental duties, I have necessarily all the details and correspondence upon me, the latter very extensive and multifarious, involving many nice matters of policy; and where cases are every day wrought out with an ingenuity as if expressly to entrap me into some inconsistency, you may conceive the difficulty of all at once consigning such a business to another head." (This refers to an attempt then being made to recall him to his military duties in London.)

"Calamity still overruns the country, moderated in the east, but increasing in intensity as you go west. West Cork and Mayo are the worst. With the means which have been expended, the sufferings of the people and the evils would have been experienced in a far less degree were they not so perfectly helpless in assisting themselves. All those who are capable of working are either so demoralized as to think of nothing but jobbing for self-profit, or, if of better feelings, are intimidated and without the energy necessary to oppose manfully the evil-doers. . . .

"Our great battle now is to maintain our determined resistance to giving relief from a general public fund in aid of wages. They ask us what is a man with a large family to do with sixpence or eightpence per day wages? without at all calling into question the propriety of giving more wages or of making any local charitable arrangement in favour of large families. Everything is to be done by the public, and if possible by Government, and our regulations are to leave openings for every species of abuse and demoralization."

The relief was continued until the autumn of 1847, when, the new crops being ready for gathering, the work was first reduced and then gradually stopped. Sir John Burgoyne returned to his duties in London, and the other Commissioners to their Departmental work in Ireland. The whole matter closed with the following minute from the Lords Commissioners of the Treasury:—

"It has become their gratifying duty to express to the Relief Commissioners the approbation with which their conduct in the execution of the important duties entrusted to them has been regarded by Her Majesty's Government, and to congratulate them on the success which has attended their efforts. This result is principally due to the patient industry and never-failing sagacity of Sir John Burgoyne, who was specially appointed to this duty as Chairman of the Commission, and it is greatly to his honour that he did not suffer himself to be discouraged by the formidable difficulties which attended the commencement of the undertaking, and that no untoward circumstance occurred during its progress which could be justly attributed to want of foresight and good management on the part of the Commission."

In 1849, Major Foster, R.E., was appointed an Assistant Commissioner to the Board of Works, to aid in carrying out the extension of arterial drainage then in progress. He re-

mained in this position till 1853, when he returned to his ordinary duties.

In August, 1853, Captain Harness, R.E., was appointed a member of the Board of Works, and a Special Commissioner to bring to a close the arterial drainage works, and to advise the Treasury as to what portion of the expenditure which had been incurred should be remitted.

It had been decreed by Act 16 and 17 Vic., c. 130, that power should be given to the Treasury to make such an allowance, and as the expenditure had reached between two and three millions sterling, the matter was one requiring much judgment and intelligence. Captain Harness filled this post most successfully, and was much regretted when, in July, 1855, he resigned it to take up an official position at the War Office. On his retirement, Captain J. G. McKerlie was appointed to succeed him, and in 1864 that officer, who had in the interim become Colonel McKerlie, was promoted to the Chairmanship of the Board.

In 1879-80, great distress prevailing over the western part of Ireland, and fears of an imminent famine being entertained, four officers of Engineers were selected to aid the Board in carrying out measures for relief and in reporting on projected County Works. They were Lieutenant-Colonel James, Major Sitwell, Captain Russell, and Captain Gehle. At a later date a fresh body of Royal Engineer officers was named for the purpose of inquiring into and reporting on the manner in which those works had been executed. This report was to be furnished direct to the Irish Government. The officers selected were Majors Sitwell and Sandford, Captains Dorward and Nicholson. The expenditure at this time had amounted to £1,200,000. The whole scheme had arisen under the Lands Improvement Act of 1847, with its subsequent amendments; and the reports which were issued periodically, between that date and 1881, show the magnitude of the operations undertaken. At first loans were only made to owners in fee for a limited number of objects, such as drainage, erection of farm buildings, or other work of a similar character, but the purposes were eventually extended to other varieties of agricultural improvement.

Reference has been made to the works carried out under the Shannon Commission. These have been most important. Not only has the Shannon been rendered navigable through a great part of its extent, but thousands of acres of useless land have been recovered and made valuable.

The Land Act of 1881 called for a further employment of Royal Engineers. Lieutenant-Colonel James was again selected as Assistant Commissioner for the purpose of organizing the branch of the Department to be employed in carrying out Sections 19 and

31 of the Act, and under him was Captain H. R. Rawson, R.E., who had been working for the Board for some time previously.

Colonel (now Major-General) James thus describes his work under the Act:—

"I commenced with a new Act of Parliament, and an untrained staff of 4 clerks and 4 inspectors; of the latter, Rawson was alone of any use at first. Not a ledger, or a printed form, or any regulation of any sort except a Treasury Minute existed, and I may, therefore, boast of having been mainly instrumental in forming a new department, which increased so fast that I had 36 inspectors and nearly 20 clerks under me before I left Dublin. By that time we had enquired into applications for many thousands of loans not averaging more than £80 each, but amounting in the aggregate to something approaching a million sterling, and many of the drainage schemes prepared had been completely executed, the land exhibiting plainly the benefits derived by the farmers. We had to deal not only with drainage schemes, but with the erection of farm buildings and labourers' cottages, new roads, reclamation of bogs, planting, &c."

General James resigned this appointment in 1885. Meanwhile Colonel Sir J. G. McKerlie had retired from the Chairmanship of the Board in 1883, and was succeeded by Lieutenant-General Sankey, R.E., who had earned a very high reputation for his services in connection with Public Works in India.

One more employment under the Irish Government remains to be noticed. It is that of Colonel Atwell Lake, R.E., who was made first a Commissioner and afterwards the Chief Commissioner of the Dublin Metropolitan Police. For the able manner in which he performed these duties he was made a Civil K.C.B. He retired in 1877.

CHAPTER VII.

Civil Railway and Telegraph Work.

Demand for Engineers to assist the Board of Trade—Sir Frederic Smith and Sir Charles Pasley appointed Inspectors-General—Successive Appointments—Details of Inspection Duties as regards the Lines and also Accidents—Indian Railways—Frontier Military Lines—The Sind-Pishin Railway—Its Origin and Commencement—Stopped after Maiwand—Its Resumption under General Browne—Difficulties of the Work—Cholera—Floods—Opening of the Chappar Bridge by the Duchess of Connaught—List of Engineers employed—Post Office Telegraphs and the Corps—Formation of New Companies for the Purpose—Persian Telegraphs in connection with the Indo-European Line.

Not long after the introduction of railways into England it became evident to the Government that they required professional advice to enable them to judge of the various schemes brought before them for sanction. It is true that Parliament was the authority to which all such schemes were necessarily referred, and from which the various Acts empowering their execution were to be obtained, still the Board of Trade was naturally consulted in the matter, and required to be well-posted in all details. Equally naturally, the Board of Trade looked to the Royal Engineers for a supply of scientific men qualified to act as their advisers.

We find that as far back as 1840, some years before the railway mania burst forth, Sir Frederic Smith was named an Inspector-General of Railways; this appointment was followed almost immediately afterwards by that of Sir Charles Pasley as his colleague. Sir Frederic's nomination was dated December 2nd, 1840, and his salary was fixed at £900, which was to include his military pay. He only held the post for a year, when he resigned it to take up the position of Director at the School of Military Engineering. Pasley then remained the sole officer of the Royal Engineers on the Railway Commission until 1844, when Captain Coddington joined him. Both Smith and Pasley appear to have held two distinct offices—

First. That of Inspectors-General, in which capacity they were members of the Commission, and with their colleagues examined and reported on the numerous projects submitted to the Board before they received the sanction of Parliament.

Secondly. They were Inspectors of Railways. This involved the close and careful inspection of all new lines after construction, and before being opened for traffic. They had also to investigate and report to the Commission on the causes of all accidents. In 1846 Major Brandreth was made a Commissioner, and in 1848 he was succeeded by Lieutenant-Colonel Ralph Alderson.

The various Inspectors, beginning with Coddington and taken in the order of their appointments, run as follows:—Captain Douglas Galton, Captain Wynne, Captain Laffan, Captain Simmons, Captain Tyler, Captain Yolland, Captain G. Ross, Colonel Rich, Colonel Hutchinson, and Major Marindin. In addition to this office the post of Secretary to the Commission has been filled by Captain Harness, Captain Simmons, and Captain Galton.

The duties of inspection are of a very responsible and minute character, and are by no means confined to investigations into the general security of the line. It may not be uninteresting to enumerate some of the points that require to be carefully gone into.

1st. *Permanent Way.*—The gauge, the description of rails employed, the chairs and their mode of fixing, the mode of securing the rails and the fastenings adopted for their joints, the sleepers, the nature of the ballast and its depth, the description of points adopted, especially the facing points, the turntables, the fences, and the drainage.

2nd. *Signals.*—Their suitability for working the line, and sufficiency in number and in principle.

3rd. *Junctions.*—Their arrangement, and proper protection.

4th. *Stations*, including platforms.—Means of access and exit, position of columns supporting roofs, footbridges, subways, gas and water supply.

5th. *Bridges*, over and under the line.—Their construction and capability for bearing the weight to be supported by them.

6th. *Gradients and Curves.*

7th. *Tunnels.*

8th. *Level Crossings.*

9th. *Rolling Stock.*

The above headings are merely given to show the great variety of points, all of which have to be most carefully and minutely investigated before a line can be passed as ready for public traffic.

But the inspection of lines is by no means the most difficult and anxious duty which the officers in the Railway Department are called on to undertake. Accidents of more or less gravity are constantly occurring, and each of these has to be reported on after a most careful inquiry. When such an accident is of a serious character, involving (as it sometimes does) a large loss of life

the duty becomes more than ever harassing. The proceedings are watched with lynx-like minuteness by the public Press. The cause of the accident may have been (indeed often is) very obscure. An opinion hastily given, or a point omitted which might aid in elucidating the matter, is at once taken up by an excited public, eager to hang some one as an atonement for the calamity. It is under such circumstances as these that an Inspector often has to carry on his duties. That they have been, as a rule, well performed is admitted by all. Indeed, it is the rarest thing possible to read a complaint, or even to hear a doubt thrown upon the manner in which these officers have fulfilled their functions.

The Railway Department of the Board of Trade is one to which the Royal Engineers may legitimately point in proof of their adaptability to the various needs of the public service.

It is in connection with railways that Sir Henry Whatley Tyler, R.E., has made for himself a reputation, not only in Great Britain, but throughout her broad Colonial possessions. A brief sketch of his services in this Department may not, therefore, be out of place. In 1853 he was appointed Inspector of Railways under the Board of Trade, a post which he filled for a period of twenty-four years. During this lengthened interval he was employed in many special services, both in the United Kingdom and on the Continent. In 1866 he inspected the railway systems of France and Italy, with a view to the adoption of the Brindisi route for the Indian mail. His reports to the Postmaster-General secured the success of the scheme. He retired from the Board of Trade in 1877, when he received the honour of knighthood. Since that time he has been engaged in the inspection of many foreign and colonial railways, his authority upon such matters being considered unequalled. He is now President of the Grand Trunk Railway of Canada, and Director of the Great Eastern Railway.

It will be seen that, at home, the duties of the Royal Engineers in connection with the Railways of Great Britain and Ireland have been purely administrative. In India there has been no such limit. There, the science and skill of the officers of the Corps have been freely called into play, not only in the administration but also in the original construction of many of the lines which intersect that great land. Especially is this the case with the frontier railways, which have of recent years been pushed forward towards Afghanistan for the support of those districts in the not improbable event of a Russian invasion. In the construction of these, which may properly be called military rather than commercial lines, it was but natural that the Royal Engineers should be called on to play the principal part.

By far the most important of them, owing to the extraordinary

engineering, climatic, and political difficulties surrounding the work, is the Sind-Pishin line carried forward towards Kandahar, which has been executed under the chief control of Brigadier-General Sir James Browne, R.E. The antecedent history of this railway is somewhat remarkable. At the beginning of the Afghan war of 1878-80 there was on the south-west frontier no line north of the Indus. An advance from Sukkur to Sibi across the plain to the foot of the Afghan mountains was in contemplation, and a very small section had been begun; still the communication from the Indus to Kandahar was practically confined to road traffic.

The war which broke out soon proved the evils that arose from a want of proper railway communication. The force which advanced to Kandahar under the command of Sir Donald Stewart was compelled to trust for its transport entirely to camels, and had itself to march the whole way, with very disastrous results to the health of the troops. In order to remedy the evil as soon as possible, it was ordered that the line from Sukkur to Sibi should be constructed without delay. Colonel Lindsay, R.E., was placed in chief control. There were no engineering difficulties beyond the scarcity of materials, all of which had to be brought from a distance. Great energy was shown, and from every part of India stores soon poured in. The consequence was that the line was laid across the plain at the marvellous rate of a mile a day. By the month of June, 1880, the foot of the mountains was reached, the terminus being 130 miles from Sukkur.

The long and terrible march across the Sind desert, which had proved so fatal in the advance of the troops towards Kandahar was spared them on their return, and doubtless many lives were saved owing to the exertions of Lindsay and the officers under him. Whilst this line was under construction the advanced sections through the mountains had been surveyed from Sibi to Pishin and Quetta. The first question to be decided was whether the line should pass through the Bolan or the Harnai pass. This was settled by the higher authorities, the Engineers having simply furnished the surveys and levels.

The Harnai route was decided on, and a beginning made with the construction of the line. Some quarters were built for the Engineers, the earthwork was started and even a tunnel pierced. Then came the disaster of Maiwand, and the work was stopped. The troops protecting the line were withdrawn for concentration at Kandahar, and the working parties and treasure sent back towards India under a small escort. This retrograde movement was not effected without loss. On August 6th, 1880, the marauding tribes fell upon a party of defenceless workmen, who

were massacred, a large amount of treasure being at the same time captured. Two months later, orders were received from the home authorities to stop all further operations on the line. The Government of Lord Beaconsfield had been replaced by that of Mr. Gladstone, and one of the first steps taken by the new Ministry was to reverse the Afghan policy of their predecessors; the result being that all the money that had been laid out was wasted.

Three years passed away, and the work that had been carried out was fast falling into decay. By that time the Government had begun to realize the fact that in their eagerness to condemn the policy of the Conservatives they had made a great mistake. Orders were therefore sent to India to recommence the work quietly. An Engineer officer of railway experience was to be named for the command, and as large a staff of executive officers to be placed under him as could be spared. Colonel James Browne was selected for the post, and five companies of the Bengal Sappers and Miners, with two half-battalions of Pioneers, subsequently increased to three, were placed under his orders. He received the rank of Brigadier-General, as he was expected to control the military operations of the troops employed as well as the Engineer service.

"There were many difficulties in getting the work started. There were at first no directing officers of any railway experience except the Engineer-in-Chief himself. Gradually executive officers began to come in one by one, as they were relieved of duties elsewhere. A batch of young lieutenants fresh from England were appointed as assistants, and thus the engineering staff was gradually organized."*

The construction of such a line as the Sind-Pishin railway was a very different matter from that of carrying out similar work in Europe, or even in the plains of India. The engineering difficulties were of themselves stupendous. In the 224 miles of which the line consists, almost every possible constructive problem presented itself for solution. In a distance of 120 miles, a rise of over 6,000 feet had to be gained, which is double that of the St. Gothard railway. On the way the most extraordinary difficulties had to be encountered. These principally arose from the rifts or defiles which had been formed in the mountains by the rivers. Of these, the most important was the Chappar gorge, about three miles long. In traversing this, the line had to pass through nine tunnels, of a collective length of 6,400 feet, also over a viaduct seventy-five feet high, in seven spans of forty

* Paper by Captain Scott-Moncrieff, R.E.—"Professional Papers, Corps of Royal Engineers," vol. xi.

feet, with a bridge over the river at an elevation of 250 feet, consisting of a central span of 150 feet, and eight of 40 feet each.

The other main obstacles were the Nari gorge, fourteen miles long, the Kochali defile, five miles long, and the summit of the pass, twenty-five miles long. Such work as this would tax engineering talent even under the most favourable conditions, but in the present instance the natural obstacles were by no means the most important that had to be overcome.

"The line does not wind its way through smiling valleys to the breezy heights above, and then, after a rush through an Alpine region, break out with mile upon mile of a verdant plain, like the railways which lead from France and Germany to Northern Italy. On the contrary, it traverses a region of arid rock without a tree or a bush, and with scarcely a blade of grass—a country on which nature has poured out all the climatic curses at her command. In summer the lowlands are literally the hottest corner of the earth's surface, the thermometer registering 124° Fahrenheit in the shade, while cholera rages, although there is neither swamp nor jungle to provide it a lurking place. In winter the upper passes are filled with snow, and the temperature falls to 18° below zero, rendering outdoor labour an impossibility. The few inhabitants that the region possesses are thieves by nature and cut-throats by profession, and regard a stranger like a gamekeeper does a hawk—something to be bagged at all costs. Food there is none, and water is often absent for miles; timber and fuel are unknown, and, in a word, desolation writ very large is graven on the face of the land."*

This is a very fair account of the climatic difficulties under which the work was done; but there were others arising from the political necessities of the case. When it was ordered by the home Government that the work should be resumed, the strictest instructions were given that it should be so started as to draw the least possible public attention to the change of front. For this reason the name was altered from its original title of the "Kandahar State Railway," to the more modest and unassuming one of the "Harnai Road Improvement Scheme." To keep up the fiction that it was a road and not a railway which was being carried out, it was ordered that no expenditure should be incurred on rails or rolling stock. As most of the heavy work lay far up the passes and away from the base of operations, Browne was naturally desirous of laying a temporary line as far to the front as possible, to convey his stores. This, however, would have been a violation of the instructions. He was therefore debarred the facilities which every contractor adopts for moving his heavy

* "Engineering," April 13th, 1888.

materials to the spot where they are to be used. He was compelled to carry all his stores on the backs of camels, or drag them on wheels up the beds of the rivers. At least £100,000 was wasted in adhering to this pious fiction before the prohibition was withdrawn.

Then, again, the Engineer-in-Chief had succeeded in making arrangements for the supply of sleepers from a juniper forest to the north of the line. This was promptly vetoed by the Government, as they feared that it might give rise to quarrels among the Afghan tribes. Everything—tools, plant, cement, timber, and labour—had to be imported from India.

Under these adverse circumstances it followed, that when a movement to the front was made, it involved the transport of everything—stores, offices, tools, plant, and the whole body of workpeople, some 14,000 or 15,000 men.

"The management of this vast exodus was a work of considerable anxiety and difficulty. A sudden influx of people, such as this, into a desolated and barren land, naturally caused a famine. Everything was eaten up, and for some days the matter of supplies was the burning question of the hour. Some idea of the quantity required may be gained when I state that 500 camel loads of food were consumed daily on the works."—(Scott Moncrieff.)

The whole narrative of the construction of the line teems with obstacles overcome, and reads like a romance. In November, 1884, a severe outbreak of cholera occurred. This was naturally followed by a stampede of the workmen, the Afghans bolting to a man. As the working season on the lower levels lasted only five months, from November to March, much precious time was lost, and the officers, who were quite ready to face the cholera demon themselves, were compelled to see the precious weeks slip by before they could recall their forces.

Then, in the early part of 1885, the rainfall was most exceptional, being close upon twenty inches in the first four months of the year—nearly six times greater than the average.

"When it is remembered that twelve large bridges were under construction, it will be understood what a terribly serious hindrance these repeated floods were. The last great floods lasted from March 30th to April 5th, and were the cause of much disaster. Old natives said there had been nothing like them for sixty years, and certainly the flood levels were far above previous records. A terrible accident occurred on April 1st. A heavy goods train, with two 48-ton engines, was coming up to Nari with stores in the early morning. One of the culverts on the old part of the line had had its foundations scoured out by the flood, and the rails and sleepers were simply hanging by the fish-plate. The train came along over it at ten miles an hour, with the result that

both engines were upset and smashed, and about a dozen waggons knocked to pieces. Three men were killed and one severely wounded. It took near a month to put right the damage caused by this flood."

Perseverance and energy the most indomitable were required to fight against these numerous and serious obstacles, and they were not wanting. Every one, from the chief downwards, was determined to bring the work to a successful issue, be the cost what it might, and they succeeded. The result was that on March 17th, 1887, an engine ran right through from Sibi to Durwaza Quetta and Gulistan, a distance of 225 miles, all made in less than three years (thirty-two and a half months). "This," as Sir James Browne says in his report, "gives a progress of 6·8 miles a month of finished, bridged, tunnelled, and, please God, permanent railway."

On March 27th, 1887, the Duchess of Connaught, in person, opened the great Chappar bridge, which she was pleased to name "the Louise Margaret." On this occasion the Duke of Connaught said that he was specially pleased that the opening ceremony was performed by the Duchess, as his first commission had been in the Corps of Royal Engineers, to which he was proud to belong, and he expressed a hope that this glorious work would last for ever as a monument of their engineering skill.

It now only remains to record the names and services of the men to whom this triumphant specimen of engineering talent is due At their head stands Brigadier-General Sir James Browne, a man who had spent his Indian career in road and railway work in the Public Works Department. The Jumna suspension bridge, the largest in India, with a centre span of 260 feet, and two side spans of 130 feet, was constructed from his designs, estimates, and working drawings. Many other bridges of only slightly less importance, as well as the laying out of mountain roads and railways, are the product of his genius. No man could have been better suited to the task now set before him, and he had the gift, so invaluable to the possessor, of stimulating those under him to the most indomitable exertions. The Sind-Pishin railway will be an imperishable record of his fame as an Engineer. He himself has told how those who were placed under his orders had seconded his desires.

The Superintending Engineer was Major Shepherd, and this is Browne's report on him :—

"Major Shepherd, R.E., has worked as an administrative rather than as an executive officer on the line, although he has done well in both capacities. It is very largely due to him that the line has been completed, for I was quite prepared to believe that in the intense heat of the lower valleys throughout the summer and autumn of 1886 it would

be necessary to stop all work, for the plate-laying and girder-erecting gangs melted away from sickness as fast almost as they were collected. Shepherd's action in doggedly sticking to it, and in living at Naree practically throughout the whole of the hot weather, keeping the men and officers to their work by his example, when he might have lived in a vastly cooler and healthier place at Sharigh, and when he was himself eaten up with fever, and in a very precarious state of health, is deserving of every praise I can give. To a man in poor health a whole season at Naree, with such exposure as he went through, keeping the plate-laying going, and erecting the girders, is something very like misery and real severe punishment, and to his devotion it is due that the rails reached the Chappar rift in time to allow the big bridge to be erected and the line to be opened."

The Executive Engineers were Captains Scott, Whiteford, Hoskyns, Scott-Moncrieff, and Davidson.

"Scott and Whiteford have had divisions both in the upper and lower sections of the line, tunnel and bridge building, and girder erection and plate-laying, with the temperature *in a house of* 124° *Fahrenheit*, and the same work with the temperature in the verandah of 18° *below zero Fahrenheit*, with deep snow on the ground and the rivers blocked with ice. Scott, who has been on the line from the very first, has made the whole of the railway for nine miles in the Kuchalee ravines with all its heavy tunnelling and bridging. . . . . He has now made over 2000 running feet of lined tunnels, mostly in most dangerous and treacherous soil, where, I may honestly say, he for months carried his life in his hands, and where no Native would venture without European example, owing to the obvious and unavoidable danger to life it involved, as shown by the many fatal accidents and grievous injuries which no skill could prevent. . . . . The laying out of the Chappar tunnels with their reverse curves fixed from the rock adits, where often men could only attain at the peril of their lives, was a work needing scientific surveying of the utmost delicacy. The handling and placing of enormous weights in such positions as the Chappar bridge, involving not merely pecuniary loss but the lives of numbers of men as the penalty for want of cool courage, skill, and precision, represents a sense of personal responsibility and anxiety for many months, which it is not easy to overstate. Add to this, that, for fully half the time, work was carried on in the face of withering sickness, which prostrated from 60 to 80 per cent. of the officers and workmen. and in the face of food scarcity, cholera epidemics, floods, want of carriage, &c. &c., and some fair idea of the whole of Scott's work may be formed."

Of Whiteford, Sir James Browne writes:—

"Where otherwise good men failed, he got things done by an almost incredible power of driving work and getting labour, and I have never met his equal in the power of managing and employing great bodies of men, such as the 16,000 men, he had in the Kuch division, in June, 1886. I do not believe that for rapidity of construction there is any piece of railway

work in India that could approach, certainly not surpass, the manner in which the 220 bridges and culverts of the Kuch division were constructed, over 22 miles in less than three months. The Harnai and Poongee bridges, the many high-level bridges at Kuch, the 150 girders erected in less than a fortnight over a chasm 100 feet high, in deep snow and ice, the mud gorge cutting and tunnel, the plate-laying, pushed upon heavy grades and curves, and in the teeth of the bitter '*Bad Ishamal*,' or north wind, which froze men and beasts to death, were tasks far beyond the power of any man not possessing Whiteford's great mental and bodily energy, which rightly has earned him the nickname of '*The Cyclone*.'"

Captains Hoskyns, Scott-Moncrieff, and Davidson were also spoken of in the warmest terms.

The following officers of Royal Engineers served as Assistant Engineers, viz., Lieutenants C. Cowie, A. Cowie, Thackwell, Stothert, Macdonald, Craster, Walton, Elliott, Stewart, Petrie, and Capper. Those attached to the Sappers and Miners were Major Boileau, Captain Martin, Lieutenants Kerry, Horniblow, Hine, and Aylmer. Of the whole staff, six were at different times invalided and sent to England under urgent medical certificate from sickness contracted on the line, and nine others had their health so broken down that they were either transferred to other work or sent to Karáchi.

The Civil Telegraph work of the Corps in Great Britain has been carried on under the Post Office department. When the Government decided upon acquiring the entire Telegraph system of the country, which had previously been in the hands of various private companies, one of their earliest steps was the adoption of a uniform shilling rate for the transmission of messages not exceeding a given number of words, irrespective of distance. This naturally led before long to a vast increase of business, and consequently caused a great strain upon the departmental staff. It soon became evident that in some manner or other the strength of that staff must be largely developed.

Colonel Gosset, who was at the time Commanding Royal Engineer at Woolwich, perceived the opportunity thus offered of obtaining a good telegraphic training for the officers and men of the Royal Engineers, who had hitherto only treated the subject in a more or less theoretical manner. He therefore brought forward a proposal, which was submitted by the proper authorities to the Secretary of State for War and the Postmaster-General, for the employment of Royal Engineers on the duty. In this way the double object would be effected of obtaining a body of thoroughly trained military telegraphists, and at the same time of adding largely and promptly to the strength of the overworked civilian telegraph staff of the Post Office.

The Marquis of Hartington, who was the then Postmaster-General, accepted the offer eagerly, and, after some preliminary discussion on matters of detail, a Treasury Minute was issued in the month of April, 1870, in which it was declared that the arrangements then existing for the employment of the Corps on the Ordnance Survey should be followed in the present case, subject to such special rules as the Post Office might from time to time lay down. A Company was brought together at Chatham, and placed under the command of Captain Webber for the purpose of undertaking the new duties. Some of the men forming this new Company had had experience in telegraph work during the Abyssinian Campaign under Lord Napier of Magdala, and others had passed through the telegraph course at the School of Military Engineering, but the great majority of the Non-commissioned Officers and men were volunteers from the different general service Companies, and totally unacquainted with the work they were about to undertake, although all skilled artificers or clerks.

After a brief training at Chatham, the Company, numbering three Officers and eighty Non-commissioned Officers and men, was moved to London, where at first they were quartered in the St. John's Wood barracks until definite arrangements for their disposal could be made. The duties to be performed were twofold—first, those connected with the offices, including the use of the instruments; and secondly, the maintenance of the lines throughout the country. A certain number of the men who were more or less skilled operators were drafted into the various offices, and the remainder employed in the renewal of the road line from Uxbridge to Oxford, which was in a very bad state. In carrying out this work, which was quite novel to the great majority of the men, they naturally met with many difficulties and not a little discouragement, but the perseverance and zeal shown equally by officers and sappers before long overcame all obstacles, and by the time the line was completed their training had made them skilled telegraph mechanics. They had now established their position, their value was duly recognized, and they were met by the civil officials of the department with the utmost cordiality. In the course of the summer their head-quarter office was fixed in Fountain Court, Liverpool Street, which was hired for the purpose by the Post Office.

At first the sight of soldiers working on the telegraph lines seemed very strange and puzzling to the public. Major Beresford, in his "Records of the Postal Telegraph Companies, R.E.," from which the above sketch has been taken, says on this point—

"The work in St. Paul's Churchyard consisted in drawing *out* old and *in* new cable, and leaving the work temporarily jointed. It was bright summer weather, and as the morning wore on the crowd began to

realize the novel sight of redcoats working in a street of the City. They were never tired of staring and crowding round, and sometimes pushing. Indeed it requires some coolness, good temper, and power of apparent abstraction to sit on the pavement with one's feet in the draw box, the cable lying across your knees, and to work carefully with the soldering iron and the spirit lamp, with an eager crowd of bodies surmounted by curious eyes gazing at you, and perhaps one of your men sitting or standing opposite doing his best to prevent the eager spectators meeting their heads in an arch over you and quite obscuring the light. As to the remarks falling round, the more callous and inattentive one is, the better. The little brown tent pitched on the footway is now familiar to the eyes of Londoners. At that time no such convenience for helping the underground constructor existed."

The Indian and Colonial telegraph work of the Corps has been extensive, and both officers and men have rendered very valuable assistance. Perhaps, however, this has nowhere else been so conspicuous as in the Indo-European line.

The great Mutiny of 1857 drew public attention to the absolute necessity for creating telegraphic communication between the mother country and her vast dependency. Submarine telegraphy was still in its infancy. An attempt had been made to form a line *viâ* Malta, Suez, and the Red Sea to Bombay. This had proved a failure. Although the Government were saddled for fifty years with an annual payment of £36,000, not one single message had ever passed. In the face of this costly fiasco, they decided to trust no longer to private enterprise, but to take the matter into their own hands, and selected the route by the Persian Gulf, in place of the Red Sea. A Turkish line had at this time been recently erected from Constantinople to Baghdad. It was proposed to connect this with India by a submarine line down the Persian Gulf, and thence by a land line along the Mekran coast to Karáchi. This route involved an extension of the Turkish telegraph from Baghdad to Bussorah, and, in order to avoid difficulties with the tribal districts through which such a line would pass, it was proposed as an alternative scheme to make a loop from Baghdad through Teheran to Bushire.

To carry out such a work required not only the consent but the active participation of the Persian Government, and this was a matter of extreme diplomatic delicacy. Colonel Sir Frederick Goldsmid was appointed at the head of a department under which the scheme was to be carried out, and Major Patrick Stewart, R.E., was named as his principal assistant, with Lieutenant Champain under him.

After a year spent in protracted negotiations, a convention was concluded under which the Persian Government consented to

construct the Baghdad-Teheran-Bushire telegraph themselves, and to permit a single British officer to visit the country for the purpose of instruction as to the best mode of erecting the line.

On the strength of this agreement, Champain was placed in charge of the Persian portion of the undertaking, and although the arrangement with that Government limited the British assistance to one person, three other Royal Engineer Officers and twelve Non-commissioned Officers were named to assist him. The officers were Lieutenants Murdoch Smith, St. John, and Pierson. The first of these has given a very good account of the difficulties encountered by the party,

" . . . . for the presence of none of whom had any provision whatever been made in the convention, and whose arrival in the country was not unnaturally viewed with the very strongest suspicions. The situation was altogether false and unsatisfactory. A line of 1,250 miles through an extremely difficult and troublesome country had by hook or by crook to be made with Persian materials, at Persian expense, by a handful of foreigners, whom every man in the kingdom, from the Shah downwards, then regarded as pestilent interlopers. Looking back with the knowledge of subsequent experience, the writer is astounded at the cool impudence of the whole undertaking. The marvel is that our throats were not promptly cut by patriotic brigands. The work, however, advanced somehow until the erection of the line was nearly completed, when matters came to a deadlock. For two or three months we withdrew altogether from the telegraph, and our departure from the country seemed all but certain. But Champain never despaired. Negotiations were renewed as a sort of forlorn hope, and, somewhat to our surprise, they resulted in a working arrangement for five months, after which, in the words of the convention, we should 'cease to have any connection with the telegraph, and at once quit the country.'"

At this critical juncture, Colonel Patrick Stewart, who had been organizing the other portions of the line, died at Constantinople. It may not be out of place here to quote an extract from an eloquent tribute of admiration to the brilliant genius of this highly gifted young officer, which appeared in the "Geographical Magazine," in October, 1874, from the pen of Colonel H. Yule, R.E:—

"Stewart joined the Corps only in 1852, and yet when he died, in 1865, there was no man of whom it was more proud than of him. His early success neither spoiled him nor begot envy in others. His early death left blank, as all who knew his career believed, an eminent place in English history—perhaps not that, for his name may yet live there as the first to mould the electric telegraph into a weapon of war. Colonel Goldsmid* refers to Stewart as an example to be imitated. But it is the

* The passage here quoted is from a review of Colonel Sir F. Goldsmid's "Telegraph and Travel."

Collingwoods rather than the Nelsons that can be held up as examples. Ordinary men might as well aspire to assimilate their features to that eager and winning countenance, like 'Young Harry's with his beaver up,' that forms the frontispiece and best adornment of this book, as take for a literal pattern that bright and ardent spirit, so rich in manifold gifts of God and in man's favour. His last years of consuming labour were spent on the great task of which this book treats; and there seems something marvellously fitting in the fact that his tomb is beside that central point of the communication, that link between Europe and Asia, that glowing focus of past and future history—Constantinople; whilst a second memorial is dedicated to his name in Galloway, a third at Karáchi."

On the death of Stewart, Champain was withdrawn from his Persian duties to fill the vacant position of Assistant to Sir Frederick Goldsmid in the general direction of the entire scheme in London, and there he remained until his death in 1887. Murdoch Smith took his place in charge of the Persian line in February, 1865, as Director, with his head-quarters at Teheran. Under him for the next eight years St. John, Pierson, and Lovett served as Superintendents. Most of the line Inspectors were Non-commissioned Officers of Engineers, as well as many of the signalling staff. To use Murdoch Smith's own words—

"Gradually I managed to get rid of the jealousy and opposition of the Persians, and at last to gain their active goodwill and friendship to get wilful damage stopped, and the lines to work perfectly. For many years the average time occupied by telegrams between all parts of the United Kingdom and all parts of India has been as nearly as possible an hour and a half. With our help and advice Persia has been covered with lines in all directions, which have brought the distant provinces directly under the control of the Central Government at Teheran, and thereby got rid of a vast amount of local misgovernment and oppression."

In 1870 Sir Frederick Goldsmid resigned his post as head of the department, and Champain was appointed in sole charge. On his death, in February, 1887, Colonel Murdoch Smith became Chief of what had become the "Indo-European Government Telegraph Department." He had previously received a magnificent sword of honour from the Shah, of which the following notice is taken from the "Echo de Perse":—

"S.M.I. le Shahinshah voulant récompenser les services marquants que Monsieur le Lieut.-Colonel Smith, Directeur Général des Télégraphes Anglais en Perse, n'a cessé de rendre à notre pays depuis un très grand nombre d'années qu'il habite parmi nous S.M.I. le Shahinshah, disons nous, a fait remettre au dit Lieut.-Colonel Smith un magnifique sabre d'honneur comme témoignage de sa haute bienveillance et de sa satisfaction Impériale."

A similar sword was at the same time sent home for presentation to Sir Bateman Champain.

In 1887 Colonel Murdoch Smith was sent out by the Foreign Office on special duty, partly departmental and partly diplomatic, to Beluchistan, the Persian Gulf, and Teheran, and in the course of this he succeeded in obtaining a renewal of the treaties in virtue of which the Engineers controlled and worked the telegraph lines throughout the Shah's dominions. Whilst at Teheran the Shah presented him with a diamond snuff-box as a "personal souvenir." He received the honour of the K.C.M.G. for his services on this mission.

The Indian telegraphic services of the Engineers have been principally administrative. Colonel Daniel Robinson was Director-General of the department for about ten years. Colonel Glover also held the same post for two years. Major Eckford was Superintendent of Stores and Workshops, and many other officers have rendered most valuable aid in controlling the vast network of lines throughout the peninsula.

CHAPTER VIII.

International Exhibitions and South Kensington Museum.

Project for International Exhibition in 1851, originating with the Society of Arts—Royal Commission and appointment of Lieutenant Colonel Reid as Chairman of Executive Committee—Designs for Building—Employment of Royal Engineers during the Construction—Letter of Prince Consort to Master-General—Cobden's Opinions—Captain Owen—The Trial of Files—Exhibition at Marlborough House—Commencement of South Kensington Museum—Science and Art Department—Fowke's Picture Galleries—His Design for Exhibition of 1862—Engineers engaged in its Construction and during its Continuance—Death of Captain Fowke—Major-General Scott and the Albert Hall—Its Roof and Acoustic Properties—Engineer Officers appointed Acting Inspectors for Science and Art Schools—Major-General Donnelly placed at the Head of the Department—Officers under him—Persian Collection presented by Major-General Sir R. Murdoch Smith.

The International Exhibition of 1851 was intimately linked with the first emergence of the Corps from that condition of depression into which it had gradually fallen during the preceding thirty years, a depression principally owing to the long peace that had followed the Napoleonic war. A slight sketch, therefore, of its origin and of the incidents which brought the Royal Engineers into connection with it will not be out of place in this work.

The idea of holding such an Exhibition arose at the Society of Arts, of which the Prince Consort was President. This is shown in the Warrant for a Royal Commission issued in 1850, addressed to the Prince Consort and others, where it is recorded that the Society of Arts "has of late years instituted Annual Exhibitions of the Works of British Art and Industry, and has proposed to establish an enlarged Exhibition of the Works of Industry of all Nations to be holden in London in the year 1851." It may prove interesting to show how this suggestion first came about. Mr. (afterwards Sir Henry) Cole, as a member of the Society of Arts, had initiated small annual Exhibitions of British Art Manufactures, which were held in the Society's rooms in the Adelphi. In 1848 he proposed to H.R.H. the President that a larger National Exhibition of such products should be formed. His original scheme did not meet with the entire approval of the Prince, and he therefore modified it so as to remove the objections that had been raised to his first proposal.

Meanwhile Mr. Cole had, early in 1849, visited a National Exhibition at Paris. It had been much debated whether this should or should not be International, but the decision had been against such a scheme, and Mr. Cole was made fully acquainted with the arguments on which that decision had been based. On his return to England the Prince granted him a special interview, when his modified proposals were fully discussed. The principal question was whether the Exhibition should be National or International. The Prince reflected for a few moments, and then said, "It must embrace foreign productions—International, certainly." He then asked where it could be held, as the site of Leicester Square, originally suggested for the National Exhibition, would be too small. To this question Cole at once replied, "In Hyde Park."

Such was the inception of the great scheme which led to the issue of the before-mentioned Royal Commission. This was dated on January 3rd, 1850, and appointed twenty-four Commissioners with the Prince Consort at their head. The Society of Arts had already named an Executive Committee to work out the details under the proposed Commission, and had entered into a preliminary contract with Messrs. J. and G. Munday to advance the necessary sums for the purpose on the basis of receiving a proportion of the profits of the Exhibition, such proportion to be decided by arbitrators. Fortunately a clause was inserted in this contract, empowering the Society of Arts to cancel it, if requested to do so by the Treasury, within a specified period.

At the very first meeting of the Commission this power was exercised. The Messrs. Munday were recouped all moneys they had advanced, including the £20,000 lodged for prizes, and at the same time were awarded a sum of a little over £5,000 as compensation for loss of time, personal services, &c.

It then became necessary to find other means for providing funds. The public were appealed to for subscriptions, and an amount of £79,224 13s. 4d. was promised in reply. Meanwhile the Commissioners thought it advisable to strengthen the Executive Committee, which had originally consisted of Messrs. R. Stephenson, H. Cole, C. Wentworth Dilke, F. Fuller, G. Drew, and M. Digby Wyatt; and for this purpose they named Lieutenant-Colonel W. Reid, at the time Commanding Royal Engineer at Woolwich, to be the Chairman of the Committee. This was done on the recommendation of Mr. Labouchere (afterwards Lord Taunton), who was President of the Board of Trade, and a strong advocate for the employment of Royal Engineers in Civil Work.

A Building Committee was at the same time formed, which held its first meeting on February 5th. Plans were called for by public

competition, the space to be covered being 800,000 square feet; and in reply no fewer than 233 designs were sent in. Out of these seventy were reported as entitled to honourable mention, and, of the seventy thus named, seventeen were further considered entitled to higher distinction. Still none of them seemed precisely suited to the object intended, whereupon the Committee invited three of their number to prepare a design more in accordance with their views. This was done, and tenders called for.

Whilst this was going on, much opposition had been raised by the inhabitants in the vicinity of the proposed site in Hyde Park to the erection of any permanent structure, and culminated in a discussion in Parliament. This difficulty led Mr. Paxton to design a building composed exclusively of iron and glass, on the principle that had been already adopted by him for the large conservatories at Chatsworth. It was at once perceived that the problem had been solved; the design was accepted, Messrs. Fox and Henderson submitted tenders, and the building was started.

We now come to the connection of the Royal Engineers with the work. It has already been stated that Lieutenant-Colonel Reid had been placed at the head of the Executive Committee as Chairman. This took place on February 12th, 1850. In the month of September, Colonel Reid procured the sanction of the Board of Ordnance to the employment of a small detachment of Sappers, six in number, which by November had been raised to thirteen, at which time Captain H. C. Owen, R.E., was also appointed to aid the Executive Committee. The number of Sappers was in the course of the next few months increased to two entire Companies, the 5th under Captain Owen, and the 22nd under Captain Gibb, R.E., with a separate detachment composed of portions of other companies under Lieutenant G. M. Stopford, R.E.

Officers of Engineers were also added to assist the Committee in their various duties, which were steadily becoming more and more arduous, so that before the Exhibition opened on May, 1st, 1851, the following were at work:—

Lieutenant-Colonel W. Reid, Chairman of Executive Committee.

Captain S. Westmacott, Superintendent of the Military and Naval Class (VIII.).

Captain J. B. Collinson, Superintendent of the British Side.

Captain H. C. Owen, Superintendent of Foreign Side, and afterwards General Superintendent.

Captain C. J. Gibb, Organization of Workmen and charge of Fire Department.

First Lieutenant E. W. Ward, Secretary to Jury Department.

First Lieutenant C. Pasley, Assistant to Captain Owen.

First Lieutenant H. W. Tyler, Persian, Chinese, and Colonial Department.

First Lieutenant G. E. L. Walker, Civil Engineering and Architecture (Class VII.).

First Lieutenant G. H. Gordon, Correspondence.

First Lieutenant G. M. Stopford, Adjutant to the Sappers.

Second Lieutenant E. F. Du Cane, Machinery (Class V.).

Second Lieutenant W. Crossman, Allotment of Space.

The duties on which the men assisting were employed were too multifarious even to enumerate. There was not a department in which they did not bear an important part, and the skill and aptitude shown by them as well as by the officers are thus referred to in a letter addressed to the Master-General of the Ordnance by the Prince Consort :—

"My Lord, I have the honour, as President of the Royal Commission for the Exhibition of 1851, to convey to your Lordship, both in my own name and in that of the Commissioners, our thanks for the cordial aid you lent us in allowing several officers of the Corps of Royal Engineers and two Companies of Royal Sappers and Miners to assist the Executive Committee in the arrangement and management of the Exhibition. Her Majesty's Commissioners consider it due to the officers of Royal Engineers and to the non-commissioned officers and privates of the Royal Sappers and Miners who have been thus employed to express to your Lordship in strong terms the sense which they entertain of the admirable conduct of the whole body whilst engaged in this novel, delicate, and responsible duty. The officers of Engineers have, in the able assistance rendered by them, afforded another instance of the useful manner in which a military body may be employed in civil services during a time of peace. The Royal Commissioners being desirous of marking their sense of the share which the different persons employed in connection with the Exhibition have had in bringing it to a successful issue, have requested the various civilians so employed to accept a certain sum of money in recognition of their services, but we have ascertained from Colonel Reid that such a course would not be agreeable to the feelings of any of the Engineer Officers who have similarly given their assistance, and to whom we should have wished to offer a similar token. . . . .

"(Signed) ALBERT,
"President of the Royal Commission."

Perhaps the best compliment paid to the Corps for its work at the Exhibition was by Mr. Cobden, who said that in his advocacy for military retrenchment and reductions in the strength of the army he would never seek to carry out his views in the Corps of Royal Engineers.

The officer brought most in contact with the Commissioners of Foreign Countries was Captain Owen, who acted as General Super-

intendent. It is gratifying to record that nearly all of them, in their farewell letters to the Executive Committee, made special mention of his services. Some may be quoted as samples. Thus, the Commissioner for the United States wrote—

"While I have received every assistance from Officers under your direction, there is one who has been high in authority, and of whom I cannot speak in too high terms of praise—I allude to Capt. Owen, of the Royal Engineers. The even temper, and calm, dignified demeanour he has observed on all trying and pressing occasions, are worthy of the highest commendation, and for one I am proud to bear witness of the energetic and impartial manner in which he has discharged his arduous duties."

The Commissioner for Austria wrote—

"To Captain Owen, whose promptitude and business-like arrangements in every matter connected with the organization or requirements of the Austrian Division which came within the supervision of his department were always to be relied upon, and always contributed so efficiently to the development of the objects on which he was consulted by this Commission, I beg to offer in an especial manner my warmest acknowledgments. It would be difficult, indeed, to overrate the obligations I feel under for the zeal and interest manifested by that officer . . . . ."

Remarks of a similar character were made by the Commissioners for Bavaria, Greece, Spain, Sweden and Norway.

It may be added, that for the three months prior to the opening of the Exhibition the following Engineer Officers of the Honourable East India Company's Service were employed, viz., Ensigns Craster, Soady, Brownlow, and Trevor, under whom were some Sappers and Miners of the same service.

One incident, in conclusion, is worthy of record, as told by Mr. Overend at a public dinner in Sheffield. A French juror had alleged that there was one French house which produced files far superior to the best Sheffield make, and had challenged a trial. This test was accepted, and Mr. Turton, whose manufacture was to represent English work, selected a Sapper named Dunlop to use his file. The trial is thus described by Conolly :—

"Two pieces of steel being selected upon which to try the files, they were fixed in two vices. The Frenchman was stripped to his work with sleeves turned up, and all encumbrances likely to affect his strength and freedom of action were removed. Dunlop was very differently garbed ; his coat was buttoned up to the throat, and he was in all respects going as it were to parade. Both now by a signal began to work simultaneously, but Dunlop, a very powerful blacksmith, had filed the steel down to the vice before the French engineer had got one-third through."

The results of the Exhibition were tangible and lasting. A collection was formed of gifts made by Exhibitors and Foreign Governments, principally consisting of raw materials, models of inventions, and other objects useful in scientific instruction. These were intended to form a Trades Museum as soon as a proper place could be provided to house them. In the interim they were lodged in Kensington Palace. A national grant was at the same time made of £5,000 to add to a collection of articles which had been gradually accumulated by the Society of Arts, and with these an exhibition was opened on September 6th, 1852, at Marlborough House, at that time vacant. These two collections were, in 1857, brought together at South Kensington, and became the nucleus of the present Museum.

The surplus of the Exhibition funds was devoted to the purchase of the Kensington estate, and on it a party of forty Sappers under Lieutenant Donnelly, R.E., was employed to clear the ground and prepare for the necessary arrangements to convert it to its new purpose.

A Science and Art Department had been created under the Board of Trade in 1853, which in 1856 was placed under the Privy Council as a Branch of the Education Department. Captain Fowke and Lieutenant Donnelly were attached to it, the latter officer, however, remaining on the strength of the London District and in charge of the Sapper detachment till 1859, when he was seconded on appointment as a Science Inspector. Shortly afterwards Captain Fowke was named Engineer and Director of the Museum of Construction. When he assumed his new duties, the only buildings on the estate were the wagon-roofed sheds that had been constructed by Sir W. Cubitt, and a nest of old houses which were in contiguity to these "Brompton Boilers." His first work was the erection of the Sheepshanks picture gallery, followed by those intended for the reception of the Vernon and Turner bequests.

Fowke had been employed, in conjunction with Owen, on the British Commission in the Paris Exhibition of 1855, and he had then carefully studied the structure and noted its defects. He was also well acquainted with those of the Exhibition of 1851. His fertile brain was constantly at work devising means for avoiding these errors. He therefore devoted himself to the designing of a building, or rather series of buildings, to be erected on the land belonging to the Commissioners, which had been purchased out of the surplus proceeds of the 1851 Exhibition. Such building was to be available for any future Exhibition to be held in London. He had not long to wait. The report of the Commission for the International Exhibition of 1862 states :—

"While we were considering how far it would be possible to obtain designs from a select list of competitors, it was reported to us that there was already in existence a plan of a building adapted for a great Exhibition of Works of Art and Industry, which had been prepared with special reference to the particular site that had been granted for the Exhibition of 1862. We were informed that the author of this plan, Capt. Fowke, R.E., an officer of skill and experience in the art of construction, who had been employed by Her Majesty's Government in the British Department of the Paris Exhibition of 1855, had framed it so as to meet the many practical defects which experience had shown to exist in the buildings both in Hyde Park and the Champs Elysées. On examining Capt. Fowke's plan we found that it was in many respects, not only well adapted for the purpose for which we should require it, but also for the uses to which the building might hereafter be turned in the event of its being left permanently on the site. Its principal features were, moreover, of a striking character, and themselves likely to form an attractive part of the Exhibition."

Unfortunately for Fowke's reputation, the building he had designed proved too costly for the Commissioners to undertake with the funds at their disposal. Its principal feature had been a noble central hall, which was to be 500 feet long, 250 feet wide, and upwards of 200 feet in height, with two domes at the wings. In order to reduce the cost he consented to expunge the grand central hall, retaining only the glass domes. But in the main arrangements of the building as regards the general exhibiting space, the picture galleries, and other details, the design was admitted by all experienced persons to be by far the most convenient that had ever been produced for purposes of that nature.

Captain Fowke was appointed Engineer and Architect for the erection of his building, Captain Phillpotts, R.E., and Lieutenant E. T. Brooke, R.E., being named as his assistants. The Second Company Royal Engineers was detailed for work at the Exhibition, the officers attached to the Company being Captain R. Harrison, with Lieutenants H. Cautley and A. H. Buckle, Major Edwards being in command of the whole. Captain Donnelly was afterwards also employed in connection with the general arrangements.

When it was opened, Captain Harrison and Captain Brooke acted as Assistants to Mr. P. C. Owen, Commissioner on the Foreign Side; Captain Phillpotts and Captain Brooke were Deputy-Commissioners of Jurors; Lieutenant Buckle acted as Assistant to the Commissioner on the British Side; Lieutenant Cautley had charge of the musical arrangements, and Captain Donnelly of the Refreshment Department.

Amongst the Jurors of the various classes were Captain Douglas Galton, Captain Fowke, Major Porter,* and Captain Tyler.

Captain Fowke continued to design and superintend the construction of all the additions made to the Museum during the rest of his life. He had also prepared sketch plans for the Albert Hall, when unfortunately his career was cut short by death in the end of 1865. He was succeeded as Architect to the Science and Art Department, by Major-General H. D. Y. Scott, who at once took up the work left unfinished by his predecessor. Scott made such changes in Fowke's original project, both as regards the size and interior arrangements of the building, that he is fairly entitled to be considered its designer as now erected. The construction of the roof was entirely his, and its novelty and daring created much stir at the time. Nothing of the kind had ever been attempted before, and he had to devise for himself methods for calculating the proper dimensions for each part. When he had completed the design, and had satisfied himself that it was strong enough to resist all possible strains arising either from its own weight or from extraneous causes such as wind or snow, and further that each part was properly proportioned, he endeavoured to find some person in the iron trade experienced in such work to check his calculations. A German was at length selected to undertake the task. The result of his calculations was somewhat startling to Scott, for he deduced that the roof should be nearly twice as heavy as that designed.

Undismayed by this great discrepancy, Scott went once more carefully through his calculations, and, having satisfied himself that he was right, refused to make any changes. In fact, he dismissed the matter from his mind, as one which he considered definitely and surely fixed. And so the roof was carried out in strict accordance with the original design, the details being worked out, under Scott, by Messrs. Grover and Ordish. The result was that when the last wedges were struck away it came down only about five-eighths of an inch, which was considerably less than had

* The writer may be pardoned the vanity of recording that at the close of the Exhibition he received a very handsome silver case, on one side of which was the inscription —"From the President and Members of the Jury of Section C, Class XI., of the International Exhibition of 1862, to Major Whitworth Porter, R.E., in recognition of his valuable assistance as Associate Juror and Reporter of that Section." On the other side were the names of the Jury —Lord Vernon (President), General Guiod, Major-General Hay, Colonel Novitzky, Colonel St. George, C.B., Sir W. Armstrong, C.B., Lieutenant-General Giovanni Cavalli, Colonel Messoud Bey, Lieutenant-Colonel Micheels, Mr. Weyersberg, Brigadier-General Hon. A. Gordon, C.B., and Mr. Westley Richards.

been calculated on, and the soundness of the principles on which he had worked was fully established.

At first considerable difficulty arose in the acoustic properties of the building, caused by the peculiar shape of the roof, which, unfortunately, generated an echo. This, however, was conquered by the introduction of a velarium below the true roof. Considering its enormous size, it may be safely averred that no other building has ever been erected whose acoustic properties are more perfect than those of the Albert Hall.

The work of the Royal Engineers in connection with South Kensington still continues as vigorous as ever. In 1878 it was arranged * that officers of the Corps should be employed as Acting Inspectors of Science and Art Schools throughout the kingdom. Advantage was taken of the fact that in every district there were quartered men with a scientific training competent to undertake the work.

This is referred to in the Calendar of the Science and Art Department:—

"The staff of four Inspectors is not sufficiently large to carry out all the requisite inspections of Science and Art Schools during the year and to supervise the conduct of the May examinations. . . . They are therefore assisted in the administrative portion of their work by Acting Inspectors. These are principally officers of Royal Engineers, who, with the sanction of the War Office and Horse Guards, are employed as acting and local inspectors to assist in the supervision of examinations and in the preliminary inspection of schools."

The principle has been found to work well, and has tended to link the Corps still more closely with the Science and Art training of the country.

Major-General Donnelly, who had for some years acted as Assistant Secretary, was in 1884 appointed Secretary and Permanent Head of the Department of Science and Art, whilst retaining the office of Director for Science.

Major-General Festing, R.E., who first joined the Department in 1864, has risen in it by degrees, and now acts as Assistant Director to the Museum under Sir P. Cunliffe Owen, the Director.

Captain W. de W. Abney, R.E., is Assistant Director for Science under Major-General Donnelly, and Major C. A. McGregor is Registrar of Science Schools.

The work of the Royal Engineers in connection with the South Kensington Museum has not been exclusively confined to constructional and administrative duties. One of the most interesting collections contained within its walls is the gift of an Engineer

* Sanctioned by Treasury Letter of 10th July, 1878.

who devoted many years to its formation. The magnificent display of objects illustrative of Persian art was the result of the unwearied research of Major-General Sir R. Murdoch Smith, when attached to the Court of Teheran in control of the Persian telegraph system. In illustration of this collection he wrote the "Handbook of Persian Art," published by the Committee of the Council of Education in 1876; and he also prepared an enlarged edition which was published some years later. When in Persia, in 1877 he received from the Shah a large and valuable collection of artistic Persian textiles, which has been added to the other exhibits.

Sir R. M. Smith is now the Director of the Edinburgh Museum of Science and Art—the South Kensington of Scotland.

CHAPTER IX.

Convict and Military Prisons. Metropolitan Police.

Associated and Separate Systems—Jebb appointed Surveyor-General of Prisons—The Pentonville Model Prison—Alteration in System of Transportation—Portland Convict Prison—Dartmoor, Chatham and Portsmouth—Military Crime and its Punishment—Establishment of Military Prisons—Board of Directors of Convict Prisons—Penal Settlement formed in Western Australia — Henderson appointed Comptroller — Company of Sappers attached—Commission on Penal Servitude in 1863—Death of Jebb—Succeeded by Henderson—Captain E. F. Du Cane appointed Director—He succeeds Henderson in all his Posts in 1869 –Reforms instituted by him—Transfer of Local Prisons to Government—Additional Engineers appointed—Advantages of the New System—Metropolitan Police—Reforms introduced by Henderson—Succeeded by Sir Charles Warren—The Jubilee Festivities—His Resignation.

The connection of the Royal Engineers with the Prisons Department has been of some standing, and seems likely, as time goes on, to become more and more close. During all the earlier years of the present century, philanthropists were deeply engaged in studying the question of prison discipline. The system at that time in vogue was clearly not suited for the reform of the criminal, indeed it pretended to no such object. Punishment, and punishment alone, was what it aimed at. The result was a steady, and eventually an alarming increase of crime, due to the contamination inevitable from the unrestrained association of criminals whilst in prison. Those who had been but beginners in crime were soon trained by their more hardened associates, and, by the time their sentences had expired, had been brought down to the level of the worst offenders against the laws of their country.

The statesmen and philanthropists of America took the lead in this vital and interesting question, and there two different experimental modes of meeting the difficulty were developed. The first, known as the Auburn System, allowed the prisoners to be associated during their hours of labour, though even then under the most rigid rules as to absolute silence. The other, called the Separate System, isolated them at all times.

In the year 1837 a Commission was sent from England to inves-

tigate and report on these two systems, and, after much deliberation, they decided in favour of the second or separate principle. The Government of the day accepted their conclusions, and lost no time in carrying them into practical effect. The first step decided on was the construction of a prison which was to serve as a model for all others. In this building provision was to be made for a separate cell for each prisoner, and the most advanced sanitary arrangements were to be carried out, whilst economy and facility of administration were to be carefully studied. At the same time a new office was created, that of Surveyor-General, in order to provide a scientific and technically skilled adviser for the Home Office on all questions connected with the erection of prisons. Captain Joshua Jebb, R.E., was selected as the first holder of this post, and he was associated with Mr. Crawford and the Rev. Whitworth Russell, Inspectors, in the design and construction at Pentonville of what was called the "Model Prison," intended to carry out the objects above referred to. This structure worthily fulfilled its purpose of serving as a type upon which future prisons should be based. Indeed, from that time, and for many long years, our prisons were recognized as being far in advance of all other buildings, public or private, as regarded their sanitary arrangements. Not only were all new prisons adapted to this principle, but most of the older ones have from time to time been reconstructed on the same model. It has been computed that a sum of not less than £3,000,000 has been expended with this object.

When Captain Jebb was first made Surveyor-General of Prisons he was doing duty as an Engineer officer at Birmingham, and he was not seconded until September 20th, 1839, nor did he resign his post at Birmingham until three months after that date. His earlier prison work was, therefore, undertaken in conjunction with, and not instead of, his military duties. He was even made a "Visitor" of Parkhurst Prison as far back as May 29th, 1839.

The next step taken with regard to Captain Jebb was appointing him a Commissioner of the new Pentonville Prison (which was completed and opened on December 21st, 1842), in conjunction with Lord Wharncliffe, the Duke of Richmond, the Earl of Devon, the Earl of Chichester, Lord John Russell, the Speaker of the House of Commons, Sir Benjamin Brodie, Mr. (afterwards Sir) W. Fergusson, Mr. W. Crawford, and the Rev. Whitworth Russell.

Whilst these reforms were being carried out at home, the difficulties and defects under which our transportation system laboured were also attracting attention. These difficulties were increased when the Australian Colonies began to protest against being made any longer the receptacle for the most hardened criminals of the mother country, and soon it became very evident to the ruling

powers that a radical change of system had become a positive necessity. The question passed through several phases,* and eventually developed into a progressive system of prison treatment. The first stage was to be spent in strict separation at Pentonville Prison, from whence the convict was to be sent either to a penal settlement, there to pass through certain stages before attaining freedom, or else to one of the prisons to be constructed for the purpose at home, where he would be employed in large public works, gaining ultimately a remission of some portion of his sentence as a reward for good conduct and industry.

This system was started by the erection of a convict prison at Portland, from designs furnished by Major Jebb, the occupants of which were to be employed in quarrying stone for the breakwater, and in the erection of defensive works to protect the harbour. Similar prisons were subsequently established at Dartmoor, Chatham, and Portsmouth.

Whilst this work in connection with civil prisons was being carried on, the question of military crime and its punishment was also being ventilated. In 1844 a Royal Commission was appointed to report on that branch of the subject, presided over by Earl Cathcart, the members being Colonel Grant, Colonel Godwin, Major Jebb, and the Rev. D. Nihill. Evidence was brought before the Commission showing that the local authorities objected greatly to the reception of military offenders in their civil gaols. They found them a very turbulent and unmanageable class, occupying space which was much wanted for their own criminals. The Commission recommended the establishment of military prisons for the exclusive reception of that class of offenders, and the creation of an office of Inspector-General of Military Prisons, the holder of which was to supervise all matters connected with his department, whether in the new military prisons or in the provost or regimental cells.

Major Jebb was appointed to this office, and since that day it has always been held by the officer at the head of the civil prisons. It may be added that the holder of both has always been an Engineer. Under the advice of these officers a system of punishment for military offences, founded on that adopted in civil prisons, has been established. In 1875 the entire charge of the administration of Military Prisons was transferred from the Under-Secretary of State for War to the Inspector-General of Military Prisons, who since that date has had supreme control over them.

* For a full and very able account of this branch of the subject, reference can be made to an article in the "Nineteenth Century," of November, 1879, contributed by Sir E. F. Du Cane, K.C.B., R.E.

In 1850 a Board called the Directors of Convict Prisons was formed to replace those various bodies which had previously managed Millbank, Parkhurst, Pentonville, the Hulks, and the new convict prisons at Portland and elsewhere. Major Jebb was made Chairman of this Board, and under his governance the progressive system adopted for the whole of the prisons was developed.

It has been already stated that the principle of transportation had not yet been abandoned. It was still carried on as regarded some of the convicts, but in face of the opposition of the old established penal settlements to the reception of any further consignments, it became absolutely necessary to seek some new place where no such difficulties would arise, and where the errors attendant on the old system could be rectified. After a futile attempt to carry this out at the Cape, which resulted in incipient rebellion, Western Australia, at that time in its infancy as a colony, was selected for the experiment.

In the old penal settlements, difficulties, much to the detriment of the public service, had often arisen between the heads of the Convict establishments and the Royal Engineers under whose direction the work of the convicts was carried on. It was, therefore, wisely determined, in starting the new penal settlement, to combine these functions in the same person, by appointing an Engineer officer as head of the establishment. Captain E. Y. W. Henderson, R.E., was selected as Comptroller of Convicts in Western Australia. He went out to the colony in February, 1850, in a ship conveying seventy-five picked convicts, and the necessary prison officers. He was accompanied by five Non-commissioned Officers of Sappers. These were employed entirely in a civil capacity under the Superintendent of the Prison, and were called Instructing Warders. Their duties consisted in attending the convict parades, and marching their parties to and from the works, being responsible for their safe custody and behaviour, and for the proper execution of the work.

The necessity for further assistance in the way of technical superintendence of the works, which, with the arrival of additional batches of convicts, were becoming somewhat extensive, led Captain Henderson in the following year to apply for the assistance of some Engineer Officers and a Company of Sappers. This request completely accorded with the views of those who then ruled the destinies of the Corps, for they were at the time strongly advocating and encouraging the extension of its usefulness by employment in various capacities under the civil authorities, either at home or in the colonies.

The work that Engineer Officers and Sappers had been doing in

the organization and management of the International Exhibition, which was at the time open, had proved the value of their assistance. No difficulty, therefore, arose in carrying out the views of Captain Henderson.

A Company was formed by collecting a number of married men from all quarters, under the idea that they would gladly settle in the colony on completion of their service. Lieutenants Wray, E. F. Du Cane, and Crossman, were selected as Royal Engineer Officers for the duty. The two latter were named owing to the proof they had already shown of their abilities in connection with the Exhibition. The first detachment of sixty-five men under Lieutenant Wray arrived in Western Australia in December, 1851, and the second party of thirty men under Lieutenants Du Cane and Crossman in January, 1852.

Each of these officers had charge of the construction of the buildings, roads, bridges, &c., on which the convicts were employed in the district where he was stationed, Lieutenant Wray being at Fremantle, Lieutenant Du Cane at Guildford, and Lieutenant Crossman at Albany. They were made magistrates of the colony and visiting magistrates of the convict stations.

The new penal settlement did not develop to the extent that had been designed by its promoters, the principle of transportation having been to a great extent abandoned before long, and the British convict prisons increased instead. Lieutenants Du Cane and Crossman were summoned home early in 1856, the exigencies of the Russian war necessitating the recall of all officers employed on duties not strictly appertaining to the Corps. Captain Wray returned later on, and in 1863 Lieutenant-Colonel Henderson resigned his office, and also came back to England.

He arrived at a time when much controversy was raging on the general principles that had been adopted in the treatment of prisoners. It so happened that in the years 1862-63 an unusually large number of convicts had received their tickets of leave. This had coincided with a curious outbreak in London of the crime of garotting. Public opinion naturally connected the two things in the way of cause and effect. It has long since been proved that they really had little or no reference to each other beyond that of coincidence, but at the time much alarm was created. The consequence was, that in 1863 a Royal Commission was appointed, with Earl Grey at its head, to consider our system of secondary punishment, viz., Transportation and Penal Servitude.

Before this Commission had completed its sittings, it became known to the members that Lieutenant-Colonel Henderson was on his way home, and it was suggested that he should be invited to give evidence on the subject, and that the closing of the Commis-

sion should be postponed for that purpose. It so happened that Earl Grey, being at the time Colonial Secretary, had been the person who originally appointed Henderson as Comptroller of Convicts to carry out the new system in Western Australia. He, therefore, willingly concurred in the general desire that that officer should be examined.

Among other recommendations made by this Commission was one to the effect that the number of Directors of Convict Prisons, besides the Chairman, should be increased from two to three. Sir Joshua Jebb, in discussing these subjects privately with Henderson, expressed his intention of recommending his appointment to the new office, and he further gave him to understand that when his own post as Chairman of the Board should become vacant he was the most suitable person to fill it. There can be no doubt that he had ventilated his opinions on both these points to the Commission, although he could have little foreseen how soon they were to take effect. It so happened, however, that very shortly afterwards Sir Joshua Jebb met with an accidental death, and the vacancy to which he had referred arose. Thereupon Lord Grey's Commission took the somewhat unprecedented course of signing unanimously a letter to the Home Secretary, in which they expressed their strong opinion of the especial fitness of Lieutenant-Colonel Henderson for the post rendered vacant by the death of Sir Joshua Jebb. This recommendation met with the approval of the Home Secretary, and Lieutenant-Colonel Henderson was appointed to all the offices held by his predecessor.

It now fell to Lieutenant-Colonel Henderson to recommend a person to fill the post of Director of Convict Prisons, for which he had himself been destined by Sir Joshua, and he accordingly named Captain E. F. Du Cane, who, as before related, had served under him in Western Australia, and had there obtained considerable experience in dealing with convicts. This officer had for some years been employed in designing the works connected with the great scheme of National Defences and on other important duties. The experience thus gained in connection with large public works was referred to by Sir George Grey in Parliament when describing the changes which were to be introduced into the Department as a justification for his selection.

In order to relieve the head of the office of some of his work, it was arranged that the new Director should also be appointed Inspector of Military Prisons, and as such fulfil most of the duties which Sir Joshua Jebb had performed without assistance. It fell to the newly-constituted Board to carry out such improvements as resulted from the inquiry of the last Royal Commission, and as transportation ceased altogether in 1867, it

became necessary to make arrangements for the maintenance of a gradually increasing number of convicts in the home prisons.

In 1869, Colonel Henderson was transferred to the difficult and onerous position of Chief Commissioner of Metropolitan Police, and he was succeeded in all his offices, viz., Chairman of Directors of Convict Prisons, Surveyor-General of Prisons, and Inspector-General of Military Prisons, by Captain E. F. Du Cane.

Changes which about this time occurred in the Colonial Office led to the transfer of the charge of the penal establishments still maintained in the colonies to the Home Office. This, coupled with the gradual accumulation of convicts at home, owing to the discontinuance of transportation, considerably increased the number and magnitude of the establishments under the charge of the Prisons Department.

One of the most important reforms carried out by Major Du Cane was the transfer of County and Borough Prisons to the Government Department. Up to this time they had been managed by local Justices, and maintained by local funds, with some aid from Government sources. The inefficiency of many of them, their want of uniformity, their defects of construction, and other evils which necessarily arose from the system under which they were worked, had repeatedly attracted attention and caused many discussions in Parliament and elsewhere, but local jealousies were too strong to allow of any real reform being carried out, or any system of uniformity being adopted. Although instances occurred where three such prisons were maintained in one town, each of which was rarely half full, and in the case of one county no less than ten such prisons existed, all efforts on the part of the Government to effect amalgamations were thwarted by the prejudices and jealousies of the local "prison authorities."

Determined to grapple with this great and increasing evil, Major Du Cane, in the year 1873, submitted to the Secretary of State a scheme for the transfer to the Government of all local prisons and the assumption of the whole cost of their maintenance. Much outcry had been raised, and very justly so, at the severity of local taxation, and the Government were most desirous to do all in their power to relieve the pressure.

Major Du Cane's proposal was seen to have the effect of transferring a large charge from local to imperial expenditure, and at the same time the amalgamations and consequent reductions that such a change would enable him to carry out, rendered the imperial charge far less heavy than that of which the local rates would be relieved.

The scheme was so eminently practical and beneficial that it was accepted by the Government. Some delay arose, owing to

the change of Ministry which took place at this time, but the new Home Secretary adopted the views of his predecessor, and brought it before the Cabinet. It was referred to in the Queen's Speech in 1876, was debated in that year, and finally became law in 1877. The governing bodies provided to manage these local prisons in England and Scotland were termed Royal Commissions. Colonel Du Cane was made Chairman of the English Commission, and his eminent services, in having carried through so important a reform, were rewarded by creating him a Civil K.C.B.

This great increase in the work of the Department rendered it necessary that some further assistance should be given, and of course the Engineers were as usual called on to furnish this help. Captain McHardy was appointed Assistant to Sir E. Du Cane in his office, and to Major-General Collinson was given the post of Architect to the Scotch Prisons Commission. After having done much excellent work, and having served on various Committees and Commissions, Major McHardy was, in 1884, made a Commissioner for Scotch Prisons, and was succeeded in his London work by Major Beamish, R.E., who had filled the position of Architect to the Scotch Prisons Commission after the resignation of General Collinson, R.E.

From the above sketch it may be seen how important has been the connection of the Corps with the Prisons Department. Indeed, the commencement of the reform which has been gradually effected in our Convict system is practically coincident with the introduction of the Engineer element. It is not claimed that these reforms are of themselves owing to that introduction. What can be proved by the facts is, that the Royal Engineers who were selected to supervise the changes thoroughly grasped the situation, and by their intelligence, zeal, and practical good sense, were enabled to carry out reforms which were felt by every one to be wanting, but the precise nature of which few could have defined. Some of the effects of those reforms may be traced from the following figures:—When the County and Borough Prisons were taken over by the Government, in accordance with Sir E. Du Cane's scheme, there were 113 of them in active operation. These have been reduced to 59. Instead of a supervising body of from twelve to twenty persons per prison, amounting in all to something like 1,500, there are now three Commissioners, under a Chairman. The economy resulting from these changes has been very great, uniform rules have been adopted, and the progressive system of discipline established. The whole of the staffs of the prison establishments of England have been amalgamated into one service, offering prospects of promotion quite

unattainable under the old system; education has been promoted; punishments have been reduced; whilst the statistics of health have considerably improved, the death-rate being much lower. Useful employment of prisoners has been developed, and no one now discharged can plead that he has been forced into crime from want of help to enable him to earn his living honestly.

In the year of the transfer of the local prisons the number of inmates was 20,400. This has been reduced in ten years to 14,966, in face of the natural increase of population by about three millions. The cost of these local prisons for the ten years prior to the transfer was about £850,000 more than the subsequent similar period, whilst the number of prisoners under sentence of penal servitude has fallen from 11,660 to 7,000.

No doubt many causes have of late years been at work tending to diminish crime, and have assisted in producing these favourable statistics; still, in so far as they are the result of reforms in our prison system—and no one can deny that to a great extent they are so—the credit may justly be claimed by the Corps of Royal Engineers, the officers of which have founded and developed those ameliorations.

It has been mentioned that in 1869 Colonel Henderson was appointed Chief Commissioner of Metropolitan Police. This was on the death of Sir Richard Mayne. The post was held by Sir E. Henderson for sixteen years, during which time he carried out a series of reforms that have brought the Police force into a state of great efficiency, making it a model all over the world. It is but a few years back that, in a debate in the Prussian Parliament, on the subject of the Berlin Police, the London force was referred to by several speakers as the type of what a body of Police should be. Amongst the numerous changes instituted by Sir E. Henderson may be enumerated:—

1. *The Development of the Detective Department.* When he took over control there were only fifteen detectives attached to Scotland Yard. This was speedily expanded to over 200, and that branch thoroughly and separately organized. It is not uncommon to hear even now complaints of the number of crimes that remain undiscovered; but it is admitted by all impartial students of the question that the work performed by the detective department is most valuable, and, in spite of some failures, could scarcely be improved on.

2. *The Introduction of "Fixed Points,"* that is, places where a policeman can always be found. The old system of patrolling did not recognize the necessity for this. Now there are several hundred fixed points, at any one of which a policeman can always be found when wanted.

3. *The Registration and Photographing of Criminals*, by means of which a very complete supervision can be maintained, and the previous history of old offenders easily traced.

4. *The Registration and Control of Hackney Carriages.* This was formerly a branch of the Inland Revenue Department, but was handed over to the Police during Sir E. Henderson's time. The improvement which has since taken place in the comfort and cleanliness of the cabs, the civility of the drivers, and the facilities for the recovery of lost property, all are due to the Chief Commissioner. It was a gratifying proof to him that these improvements were as warmly appreciated by the cabmen as by the public, that he received a testimonial in the form of a silver hansom cab, subscribed for by the cab proprietors and drivers of London, as a token of their gratitude for the warm interest he had always taken in their welfare.

5. *The Increase in the Police Force.* During the sixteen years of Sir E. Henderson's occupation of his post no less than 710 miles of new streets had been added to the London Police district. It necessarily followed that this vast extension of the area of their duties demanded a great increase of strength, and although this increase has been by no means proportionate to the necessities of the case, still it has been large. The numbers of all ranks in 1869 were 8,887; in 1884 they were 12,880. This enlarged force has been during the time far more efficiently organized, a simple system of military drill introduced enabling the men to be moved in bodies without disorder, and many other useful reforms instituted.

In 1885 Colonel Sir Charles Warren, R.E., succeeded to the post on the resignation of Sir E. Henderson. He has had during the three years of his rule many very difficult and complicated problems to solve. Chief amongst these have been the arrangements necessary for the preservation of order during the Jubilee festivities of 1887, and the suppression of the Trafalgar Square riots.

As regards the manner in which he has performed his duties, it will only be necessary to quote the following two letters in support of the assertion that in no other hands could the work have been better done. The first is dated Whitehall, June 23rd, 1887, and is signed by the Secretary of State, Henry Matthews. It runs thus:—

"In obedience to the Queen's express commands, I have great satisfaction in signifying to you Her Majesty's entire approbation of the excellent manner in which the arrangements for preserving good order were made by you, and executed by those acting under your orders, on the occasion of Her Majesty's visit to Westminster Abbey to attend the Special Service of Thanksgiving for the attainment of the Jubilee year of Her reign."

The second is a fitting corollary to the first. It is thus worded :—

"December 26th, 1887.

"Dear Sir Charles,

"I am very glad to be the channel for informing you that in special recognition of the services you have performed in maintaining order in the Metropolis during the past difficult year, the Queen has been pleased to confer upon you a Knight Commandership of the Bath.

"Believe me,

"Yours faithfully,

(Signed) "SALISBURY.

"Col. Sir C. Warren, G.C.M.G."

Sir Charles Warren also received letters couched in similar terms of commendation from H.R.H. the Prince of Wales and H.R.H. the Duke of Cambridge.

Whilst this work has been going through the press the unfortunate incident of Sir Charles Warren's resignation has taken place. It would not be becoming to enter here into any disquisition as to the merits of the case or the justice of the grievance which has led to the retirement of the Chief Commissioner.

The matter was fully debated in the House of Commons on the evening of November 14th, 1888, and the following extracts from the speeches of two Home Secretaries bear ample witness to the qualifications both of Sir Edmund Henderson and Sir Charles Warren. Speaking of the former, Sir W. Harcourt said :—

"He always regarded the break-out in February, 1886, as a most lamentable accident. It was one of those things which had not occurred before for many and many a year, and which he did not believe would occur again. He had himself always regarded the retirement of Sir E. Henderson with the greatest regret. (Hear, hear.) Sir E. Henderson followed Sir R. Mayne, and he believed both were admirable administrators of the police of London. Sir E. Henderson was a man who was very calm and self-possessed ; he was not fussy and fidgety, and he thoroughly understood and had great reliance upon the general disposition to order and good behaviour on the part of the population. Whatever might be thought of the particular accident which led to his retirement, that ought to form no ground whatever for altering in any material particular our system of police administration. Sir E. Henderson had to deal certainly with very troubled times, but under his administration things went very smoothly both inside and outside Scotland-yard. It was said by one of his honourable friends that Sir E. Henderson was a military man. But one of the great merits of Sir E. Henderson was that he did not administer the police in a military spirit." . . . . "It was much easier to get rid of a good man than to get a better. In the case of Sir Edmund Henderson, he always

thought that we might have fifty worse before we got as good a man again." (Hear, hear.)

In reply, the Home Secretary, Mr. Matthews, said:—

"He was glad to have the opportunity furnished by what fell from the hon. member for the Horsham Division, to do the fullest justice to Sir Charles Warren. Sir C. Warren was a man not only of the highest character, but of great ability. During his tenure of the office he had displayed the most indefatigable activity in every detail of the organization and administration of the force. By his vigour and firmness he had restored that confidence in the police which had been shaken—he believed, with the right hon. gentleman, unjustly shaken—after the regrettable incident of 1886. . . . Sir C. Warren had shown conspicuous skill and firmness in putting an end to disorder in the metropolis, and for that he deserved the highest praise." (Hear, hear.)

CHAPTER X.

Archæological Exploration and Travel.

Murdoch Smith at Halicarnassus—Explorations at Cyrene—Discovery of Sculpture—Transport to the Coast—Excavations at Jerusalem by Warren and Conder—Difficulties encountered—Results obtained—Conder's suggestion about Jeremiah's Grotto—The Tomb there—Gill's Travels in Persia, China, and Tibet—General Gordon at the Equatorial Lakes—Shepherd's Travels in Mongolia and Siberia.

Two more subjects which have been objects of pursuit to officers of the Royal Engineers remain to be described. These are Archæological Explorations and Travel.

As regards the first, the names of three officers have been brought prominently before the public—Sir R. Murdoch Smith, Sir Charles Warren, and Captain Conder.

In the very beginning of his service as an Engineer, Murdoch Smith was selected to proceed in charge of a small detachment of Non-commissioned Officers and men of the Corps to be attached to the expedition under Mr. C. T. Newton, intended to explore the sites of some of the principal Greek cities in Asia Minor. At the close of its labours, Newton published a "History of the Discoveries at Halicarnassus, Cnidus, and Branchidæ." In this work it was shown that Murdoch Smith was the first to perceive, and point out a clue to the true restoration of the Mausoleum or Tomb of Mausolus, the remains of which were exhumed by the expedition. For three years Smith was employed in the work of excavation, and removal of the colossal marbles which now form a prominent feature among the Archæological treasures of the British Museum.

It was unquestionably while engaged on this duty that Murdoch Smith became imbued with that taste for exploration which led to the expedition to Cyrene. Fortunately for him he found at Malta (where he was stationed after his return from Asia Minor) a kindred spirit in Lieutenant Porcher, R.N., who was at the time attached to H.M.S. *Hibernia*, the Guardship at that station. The two officers turned their attention to Cyrene as a likely field for profitable archæological research. Murdoch Smith gives, in

his "History of the Recent Discoveries at Cyrene," the following reasons for their selection of this site :—

"The simple fact of Cyrene having been the capital of a flourishing Greek colony, afforded presumptive evidence of the existence of interesting and valuable remains; and the absence of any stationary population on its site after the date of the Arab conquest favoured the hope that such remains would be found in a comparatively perfect condition. . . . . In the case of Cyrene it was almost certain that the site of the city had been unoccupied for upwards of 1,000 years, so that it was highly probable that whatever sculptures and other remains had escaped destruction at the hands of the early Christians and first Arab conquerors, must soon have been hid from view by a luxuriant vegetation, and, except in the most elevated situations, become gradually buried beneath the surface of the soil."

Such were the favourable aspects of the case, but before deciding upon attempting so promising a field for exploration, it was advisable to consider the unfavourable side of the question, which Smith thus records :—

"Although there were sufficient grounds for regarding Cyrene as a good field for excavation, there were circumstances peculiar to its position and the present condition of the country which made it very doubtful whether such excavations could be carried on successfully. One great obstacle lay in the fact of its inland position in a mountainous country, from which it was to be feared that heavy and fragile objects, such as marble statues, could not be conveyed to the coast for embarkation except at excessive cost of time, labour, and money. Another no less important consideration was the character of the present inhabitants of the country—the Bedouins, a fanatical race of wandering Arabs, proverbial for their rapacity and violence."

These difficulties did not, however, daunt the young explorers, and having submitted their proposals to the proper authorities, leave of absence was granted, and they were conveyed in H.M.S. *Boxer* to Tripoli, which was reached on November 21st, 1860. From this point, after having procured the necessary authority from the local governors, they made their way to the scene of their future labours.

The site of Cyrene was honeycombed with tombs excavated in the rocks, and in one of the most commodious of these they took up their residence :—

"The tomb we ourselves occupied was at the bottom of a steep hill, about 250 yards from the Fountain of Apollo, and almost overhead there was a long range of larger chambers also cut in the rock, which we used as servants' quarters, kitchen, stable, &c. Our room had two doors or openings, one of which we built half-way up with stones and mud, leaving the upper part open to serve as a window. The mats which we had bought at Benghazi made an excellent carpet, and one of them sus-

pended over the entrance was a good substitute for a door. In the course of time we gradually improved our quarters by paving the entrance with tiles, making steps up to the kitchen, &c. We contrived to build quite a respectable door with rough planks cut from the trunks of trees."

The party consisted of the two explorers, two Maltese servants, and four negroes hired at Benghazi for the labour of excavation. The firman granted to them gave authority to dig for sculptures, and to remove such as they found. Their first efforts were fruitless, and the excavators most unskilful. The negroes were totally unused to the pickaxe or crowbar, and most of the heavy work had to be done by themselves. After several failures they were at length rewarded by a valuable discovery, which Smith thus describes :—

"We began work at this temple on the afternoon of the 2nd, by digging along the outside of the western wall." . . . . "We then began to dig inside the temple, at the western end, going gradually eastward. We were soon rewarded for our labour by the discovery of a very perfect marble statue of life size. The head and both hands were gone, but otherwise the figure was uninjured, the surface being almost without a scratch." . . . . "Two days afterwards the figure was all but completed by the discovery of the head and left hand near the same place. The head, that of a youth wreathed with grapes and vine leaves, and the hand holding a cluster of grapes, at once identified the statue as one of Bacchus. The drapery, falling from the left shoulder across the right knee, left the greater part of the figure nude. The first thing to be thought of was its immediate removal to a place of safety, as the Arabs, in their hatred of images, would have considered its destruction a meritorious act."

They decided upon conveying it surreptitiously to their tomb, but this was a work of no little difficulty. A tent was pitched on the spot to cover the statue whilst preparations were made for its removal. This was done by means of a rough sledge, constructed of a cedar tree felled for the purpose :—

"By placing slings under the shoulders of the statue, and heaving on them with the spars, we got the figure into an upright position. The sledge, well covered with mats, was then lashed firmly to its back, care being taken to have the lashings well padded to prevent their chafing the surface of the marble. The sledge, with the statue attached, was then gradually lowered by means of the spars, and a drag-rope made fast to it. By dint of hauling and shouting, we got about half-way to our tomb before dark, when we again pitched the tent, and set the guard for the night. Next day we tried the experiment of yoking in a camel, which proved quite successful. In the course of the forenoon the statue was safely deposited in our kitchen, where it was afterwards covered with a tent and walled up."

This was only the first of many similar discoveries, the most

important of which was the colossal statue of Apollo in another temple. The head was broken off, and the body in three pieces. The trunk of the tree, lyre, serpent, bow and quiver, and some of the drapery, were found in pieces, which were carefully collected. Altogether there were no less than 121 separate fragments. The statue is now in the British Museum, having been put together without the slightest addition.

The next important question was that of transport. The greatest difficulty to be overcome between Cyrene and the coast, was the descent of the Augubah, a range of precipitous hills; this would undoubtedly entail much labour, but seemed on the whole practicable.

Smith, therefore, communicated with Lord Russell, announcing his discoveries, and suggesting how they should be conveyed to the coast. His Lordship at once directed that a man-of-war, with the necessary stores, should be sent to Marsa Sousah, to embark the sculptures. At the same time the Trustees of the British Museum voted a grant of £100 towards the expenses of the expedition.

H.M.S. *Assurance* arrived, in consequence, on May 10th, and, with the utmost practicable despatch, the arrangements were made for conveying the precious burdens to the ship. This involved considerable difficulties all along the route, but the most critical portion of the work was the descent of the Augubah :—

"After considering every possible way in which it could be done, we decided on lowering the wagons straight down the face of the hill by means of tackle. . . . About one-third of the way down there was a nearly level ledge or terrace, which served as a convenient halting-place, from which to make a fresh start. To reach this point, however, the wagons, as they were being lowered, had to be guided in a slanting direction across the face of the hill, which was safely done with the first wagon, by means of handspikes."

The second attempt was, however, not so fortunate, a portion of the tackle having given way :—

"To our horror, away went the wagon at a tremendous pace, and the anchor after it, almost flying. For a second or two the destruction of the wagon and the Apollo seemed inevitable, as it was heading straight for a precipice, two or three hundred feet in height, when, to our relief, it gave a great bound, and landed itself in a large cavity in the rock. Strange to say, not even a spoke of a wheel was broken."

After this mishap had been put right, all went well, and the wagons were safely lowered to the bottom of the hill.

It will not be possible to give further details of their subsequent proceedings. These may be summed up in the following extract

from a sketch of Sir R. Murdoch Smith's career, in the "Cosmopolitan" for July, 1888:—

"They encountered great difficulties with the Bedouins, who frequently threatened to make an end of them, which they could, of course, have easily done at any moment. By diplomatizing with the Arabs, and taking advantage of their own perpetual internecine feuds and fights, they managed to scrape through the year unscathed. Their life was, of course, a very hard one. They were always on the *qui vive* for some new freak of the Bedouins; with the barest means of sustenance, and sometimes prostrated by fever, they still laboured away. The results, such at least as could be removed, are now in the British Museum, conspicuous among them being the colossal marble statues, almost intact, of Apollo and Bacchus, and numerous portrait statues and busts, bas-reliefs, bronzes, inscriptions, &c."

It may be added, in conclusion, that another visit was paid to the explorers by a man-of-war, the *Scourge*, which carried off a number of additional trophies, and also that they received a second grant from the British Museum towards the expenses, this time the amount being £500.

The excavations which were carried on at Jerusalem by Lieutenant Warren, and afterwards by Captain Conder, were not, like those at Cyrene, for the purpose of recovering specimens of ancient art; they were intended to elucidate, if possible, many doubtful questions of biblical archæology. Perhaps the most important, and certainly the most interesting, of these was the correctness, or otherwise, of the site of the Holy Sepulchre as at present fixed by tradition. The true direction of the Second Wall, if once ascertained, would throw great light upon this point, as, should this traditional site be proved to be embraced therein, it would be clearly shown to be fictitious. Beyond this, the course of the First, Second, and Third Walls would involve the site of the Towers of Hippicus, Phasælus, Mariamne, and Psephinus. The direction of the Tyropœon Valley required also to be traced, as on it would greatly depend the line of the Second Wall. There were many other subsidiary questions which it was hoped might be solved by underground research.

The task was entrusted to Lieutenant Warren, who was assisted by three Non-commissioned Officers of Royal Engineers, Corporals Birtle, Phillips, and Hancock. The difficulties in the way of carrying out the objects desired by the Committee of the Palestine Exploration Fund were enormous, and may be ranked under three heads: obstruction on the part of the Pashas, physical dangers, and want of money. As regards the first of these, nothing but extreme tact, combined with firmness, could have prevented the complete suspension of the work, which was repeatedly threatened.

Indeed, the Vizierial letter, under which the party was supposed to be acting, expressly forbade excavations at the Noble Sanctuary and the various Moslem and Christian shrines. How, in spite of this, Warren succeeded in his object, is well told in his "Underground Jerusalem."

The question of physical danger, owing to the want of sufficient mining apparatus, and the very treacherous nature of the soil, which was simply the accumulated refuse of ages, was one treated lightly, it is true, by Warren and his three subordinates, but none the less extremely serious. On this point the words of the late Dean Stanley are worth recording:—

"In the plain and unadorned narrative of Captain Warren, the difficulties and dangers of the undertaking might almost escape notice. Yet the perils will appear sufficiently great to any one who draws out from the good-humoured story the fact that these excavations were carried on at the constant risk of life and limb to the bold explorers. The whole series of their progress was a succession of 'lucky escapes.' Huge stones were day after day ready to fall, and sometimes did fall, on their heads. One of the explorers was 'injured so severely that he could barely crawl out into the open air'; another extricated himself with difficulty, torn and bleeding, while another was actually buried under the ruins. Sometimes they were almost suffocated by the stifling heat; at other times they were plunged for hours up to their necks in the freezing waters of some subterranean torrent; sometimes blocked up by a falling mass without light or escape."

The third difficulty was want of money. When Warren started from London he was given a sum of £300 for expenses, but he was not told that there was nothing more left in the treasury of the Fund. The idea was, that when the excavations were begun sufficient public interest would be excited to ensure ample subscriptions being received. As Warren somewhat tersely put it, he was told, "Give us results, and you can have money," whereas, he was obliged to retort, "Give me money, and I can procure you results." The consequence of this playing at cross-purposes was that, at one time he had advanced out of his own resources no less than £1,000. It certainly seems hard that he should have been called on, not only to give his time and talents and to risk his life, but also to find the means whereby alone the exploration could be carried on.

The work was begun in the spring of 1867 and prosecuted, with some interruptions, for three years, after which Warren returned home. Captain Conder has since then continued the research, and has added much to the information obtained.

Warren thus records the manner in which he overcame the obstructions placed in his way by the Pasha:—

"On my return to Jerusalem at the end of June, 1867, I found the Pacha still putting difficulties in our way, but we were fast approaching the close of the first scene in the drama, and after that I expected we should be able to get on better. My idea was as follows: the Pacha strictly prohibited our working nearer to the walls than forty feet, but he was quite unaware of our power of mining, and felt quite safe so long as we were not near the wall above ground. My object then was to commence at the required distance and mine up to the wall, obtain the necessary information, publish it, and then when it was known at Constantinople, to commence again on the surface about twenty feet off, and if stopped to protest on the plea that we had already been up to the wall; that it was known at the Porte, and that the custom was established. . . . In July we got up to the Sanctuary wall at the south-east angle, and having examined it the account was sent home."

It was by perseverance and good temper, never yielding an inch, but advancing by slow and steady steps, that he succeeded in bringing round the authorities to his views, so that before the first year of his sojourn had expired he was no longer troubled by them. One more incident must be quoted, although, strictly speaking, it had nothing to do with the explorations:—

"On one occasion when Corporal Birtles was employed at the south-east angle of the Noble Sanctuary, he found himself accosted in the most violent English, consisting of strings of oaths; looking up 150 feet above him he saw that they issued from the mouths of black faces; as the black men at Jerusalem do not talk English this was a remarkable occurrence, and on making inquiry it was discovered that these men were deserters from our army in India at the time of the mutiny, who had sojourned in secret at Jerusalem, but they were so excited at the sight of a red coat, and being in the Sanctuary and 150 feet above Corporal Birtles, they could not resist the inclination of swearing at him; on an Indian officer going up to pay them a visit they were overcome with fear and fled the country."

In August, 1868, Serjeant Birtles arrived, and in the following month four other Non-commissioned Officers; meanwhile Corporal Duncan had died and was buried in the British Cemetery. Of him Warren records: "He was an excellent fellow, exactly suited to the work we had in hand, and his loss was doubly to be regretted." Corporal Turner, one of the new arrivals, soon fell ill and had to be invalided home, and not long afterwards the same occurred to both Corporal Ellis and Corporal Cocks. Indeed, all the party suffered at times most severely from fever brought on by the hard work and exposure.

Besant, in his "Twenty-one Years' Work in the Holy Land," writes:—

"It is impossible here to do more than to recapitulate the principal results of excavations, which are without parallel for the difficulties pre-

sented and the courage displayed in overcoming them. As regards the walls of the Temple Area, Warren proved that this colossal work is covered up with *débris* in some places to a depth of 100 feet, and in one place to a depth of 125 feet below the present surface of the ground. The foundations were laid bare by means of deep shafts sunk through the *débris*, and it was proved that the stones had been lowered into their places ready dressed, that the dressing of the stones is not uniform, for in some parts they present a rough face with a marginal draft. The corner stones are from 14 to 15 feet in length, and from $3\frac{1}{2}$ to $4\frac{1}{2}$ feet in height. On some of those at the S.E. angle, Phœnician characters were found ; jar handles were also found here with Phœnician characters, which are variously interpreted. The arch called Robinson's arch was proved to have been the last of a series of arches leading to the Temple from the Upper City ; the voussoirs of two arches, one constructed after the other had fallen in, were lying buried in the ground beneath it. Excavations were also made at Wilson's arch higher up on the same side of the wall, and disclosed a series of rock-cut chambers, the purpose of which is unknown, with a broad subterranean passage, evidently designed for the secret passage of troops from the citadel to the Temple in case of need. . . . . The Tyropœan valley was followed up, and rock levels have been obtained showing the contour of the whole city except at one point, namely, that within the south-west front of the Haram Area, concerning which there is still some uncertainty. The conclusions drawn from the facts by Sir Charles Warren are, that the oldest portion of the wall is the south-east part and the south as far as the Double Gate ; that Solomon's palace stood in the south-east, and that the south-west was built by Herod, and that the Temple stood in the middle, where, in fact, Jewish, Christian, and Mohammedan tradition all unite in placing it." Bezant continues : "It is certain that nothing will ever be done in the future to compare with what was done by Warren. . . . . It was Warren who restored the ancient city to the world ; he it was who stripped the rubbish from the rocks and showed the glorious Temple standing within its walls 1,000 feet long, and 200 feet high, of mighty masonry ; he it was who laid open the valleys now covered up and hidden ; he who opened the secret passages, the ancient aqueducts, the bridge connecting the temple and town. Whatever else may be done in the future, his name will always be associated with the Holy City which he first recovered. Many questions, it is true, still remain unanswered, many gaps in our knowledge have to be filled up, but in the main features those who have followed Warren and Conder in their statement of facts and conclusions, and who agree with them, have no longer any doubt as to the position of the Temple and the real builders of the Kubbet es Sakhra."

Although the line of the Second Wall has not been conclusively traced, it seems now almost a certainty that it embraces the usually received site of the Holy Sepulchre, and therefore that site is probably not genuine. Both Warren and Conder are very positive on the point, and the latter has gone so far as to suggest the

possibility that he has discovered the true Sepulchre at a totally different place. This is the hill above Jeremiah's Grotto, which he considers likely to be the true Golgotha. He asserts that by ancient Jewish tradition it was the place of public execution, and according to Mejr ed Din "was an ill-omened place, connected in the imagination of Moslems with death and judgment (like the Kedron Valley beyond it). Possibly in this we may have some trace of the ill-omened site of the ancient place of execution."

After pointing out that the form of the hill is not unlike that of a skull, and that it is held by many that the term Golgotha referred to the shape of the ground, he shows that the site of Jeremiah's Grotto is peculiarly adapted for a place of execution owing to its commanding position :—

"From the summit the eye roams above the city walls over the greater part of Jerusalem, while on the west the ground rises beyond the intervening valley like a theatre. There is hardly another spot near Jerusalem so fitted to be the central point for any public spectacle."

Having thus given his reasons for considering that this spot might well have been the Golgotha of the Gospels, he proceeds to describe an ancient tomb discovered by him in the immediate vicinity, and winds up with the following suggestions :—

"It would be bold to hazard the suggestion that the single Jewish sepulchre thus found is indeed the tomb in the garden nigh unto the place called Golgotha which belonged to the rich Joseph of Arimathea ; yet its appearance so near the old place of execution, and so far from the other tombs in the other cemeteries of the city, is extremely remarkable."

It will indeed prove strange if it has fallen to the lot of an Engineer to discover the real tomb of our Lord after the lapse of nearly nineteen centuries, and after the whole of Christendom has for the greater portion of that time been misled by early tradition.

Leaving the subject of Archæological Exploration, the remainder of this Chapter will be devoted to a few brief references to the work done by Engineer officers in the way of travel in countries rarely visited by Europeans. Foremost among these adventurous spirits stands the name of Captain Gill, whose sad fate at the beginning of the Egyptian war of 1882 caused such universal regret. This officer, after some years' service in India and elsewhere, had returned to England in 1871 upon inheriting a large fortune from a distant relative.

From this time forth he gave free scope to the intense desire for exploration and adventure which was innate in him. As in every instance, he made this feeling subservient to the needs of

his country, no obstacles were thrown in his way by any narrow-minded restrictions on the part of those who were his immediate military superiors, nor did he experience any difficulty in obtaining that leave of absence from the ordinary duties of the Corps without which his services in this line would have been lost.

His first expedition was undertaken in Persia, in company with Colonel V. Baker. He published an interesting account of this in the "Geographical Magazine," accompanied by a map embodying his route surveys. These, although rough, and put together under circumstances of extreme difficulty, proved very valuable additions to geographical knowledge. They were also of considerable political importance, as may be seen by the following extract from a paper by Sir Oliver St. John, R.E., who was at the time engaged in the India Office compiling a new map of Persia:—

"About 1869-70 the Russians obtained from the Shah a recognition of their claim to all the territory on the eastern shore of the Caspian, north of the Atrek river. The Persians (no doubt with truth) affirmed subsequently that their recognition was confined to the littoral, while the Russians contended that their right to all districts north of the Atrek *throughout its course* had been acknowledged. Previous to Gill's journey the Atrek had been represented on our maps as a stream of the orthodox type, with numerous affluents on both banks, or as a stream with few affluents on the north and many on the south. Inhabited Persian districts were all placed on the south bank, and taking the Russian definition of their treaty, it looked as if nothing but bare mountain and barren desert had been given them. But Gill and Baker found that the main stream of the Atrek had no southern affluent, but many northern ones, and that its north bank for a considerable distance from its source was lined with Persian towns and villages. One entire district, Darah-Gaz, lying quite clear of the river to the north, was practically discovered by them. The result was that we were able to back up the Persians in their interpretation of the understanding about the Atrek, by appealing to facts, and that the Russians at last modified their claims."

Gill's next tour was one of Chinese exploration, which lasted from September, 1876, to May, 1878. His diary of these journeys was published under the title of "The River of Golden Sand." For this expedition he received the Gold Medal of the Geographical Society, the award declaring that it was assigned on account

"of the admirable geographical work performed during two long journeys of exploration voluntarily undertaken along the northern frontier of Persia, in 1873, and over previously untravelled ground in Western China and Tibet in 1877, and especially for the careful series of hypsometrical observations and the traverse survey made during the latter journey, by which we have for the first time the means of con-

structing with considerable accuracy profile sections of those elevated and little known regions. Also for the elaborate memoir contributed to the 'Journal' of the Society on the subject of his Expedition, and for the maps of his route in 42 sheets on a scale of two miles to the inch."

The Paris Geographical Society also gave him a gold medal. Gill thus describes a portion of his lengthened tour :—

"Being at Shanghai in January of that year (1877) and anxious to see something of the little-known Central China, I was not slow to accept an offer made me by Mr. Consul Baker that I should accompany him to Ch'ung Ch'ing. Thence I travelled by myself for a couple of months through Tsu-Liu-Ching, Ch'eng-Tu, Li-Fan-Fu, Sung-P'an-T'ing, Lung-An-Fu, and back to Ch'eng-Tu where I was joined by Mr. Mesny, a gentleman whose long service under the Chinese Government, and intimate knowledge of the language and ways of the people, enabled him to render me the greatest assistance, and to whom I am mainly indebted for the admirable and friendly relations we always maintained with the officials and with the people."

In company with this gentleman Gill made a most adventurous journey, starting from Ch'eng Tu, travelling westward across the frontier of Tibet, and on reaching Bat'ang turning south, until Bhamo was reached, whence an English steamer took him to Rangoon. The first part of the tour was through the Province of Ssu-Ch'uan, which he describes as

"one of the most beautiful, perhaps the richest, and for foreigners certainly the most pleasant in the Empire, endowed by nature with every charm of variegated scenery—giant mountains in the north, of whose peaks of perpetual snow little more has been known than the wild statements of ancient geographers, that one of them attained a height of 36,000 feet; fertile plains, where in the driest season the rice crop never fails, and undulating hills where streams have cut deep channels in the soft sandstone."

One of the most extraordinary things in this province described by Gill was seen at Tsu-Liu-Ching, where brine is drawn from deep wells and evaporated by gas that rises through borings, pushed to immense depths for the purpose. One of these borings which he saw in progress was then 2,170 feet deep, the average progress, when no accident occurred, being two feet a day. He thus describes a finished fire-well near the one in progress and somewhat deeper :—

"A bamboo tube about 3 feet long had been put into the mouth of this boring, and some clay was plastered over the upper end to prevent the bamboo from burning. Up this well and through the bamboo the gas ascends from the bowels of the earth and is lighted at the top. When the light was extinguished, the odour of the gas was very powerful of sulphur and very slight of naphtha."

The brine was raised from the well by means of a bamboo tube 100 feet long, open at the top and closed at the bottom by a valve, thus serving as an elongated bucket. The brine when raised was conducted to evaporating pans over the fire jets above described.

It was only in the fertile province of Ssu-chan that the travelling was thus attractive. When Tibet was reached matters changed considerably; fertility and cultivation were replaced by sterility and desolation.

"The mountain country beyond Lit'ang is very desolate: rough, undulating ground in every direction, covered with loose stones and huge rocks of granite; low hills backed by jagged peaks, their tops covered with a sprinkling of snow, but not sufficient to hide the barrenness and nakedness of the rocks beneath. At the dreadful summit of Nga-Ra-La-Ka the mules were a few hundred yards ahead, and we heard the muleteers set up a shout of joy as they gained the highest point. They say that in foggy weather people often swoon here; one of our people seemed to feel the want of oxygen in the air very much, and could hardly drag himself along. This pass is 15,750 feet above the sea; just at the top there were patches of snow lying on the ground, but they were very small. After passing the crest we descended over the same dreary wastes of huge blocks of hard whitish-grey granite."

It is not possible within the limits of this work to follow Gill farther in this adventurous tour.

In the spring of 1879 he was sent to Constantinople, in company with Major Clarke, R.A., as Assistant in the Commission for the settlement of the new Asiatic boundary consequent on the treaty of Berlin. This Commission, however, owing to disagreements between the British and Russian members, never did any real work. In the summer of 1880, on the news of the defeat at Maiwand, Gill hurried to the scene of disaster, but did not arrive till after the relief of Kandahar by Sir Frederick Roberts. Eager, however, for employment, he obtained permission to join Sir Charles Macgregor in his expedition against the Maris as survey officer. Of his services at this time Macgregor wrote:—

"Gill came out to Quetta just as my brigade was going off, and I was very glad to take him with me. He undertook and carried out in the most conscientious manner a survey of the country we went over, and though this was of itself a sufficiently laborious task for any man, he was always ready to lend a hand where he could be useful; he did many times prove of great assistance to me, and in my despatch I mentioned being specially indebted to him. After we got back, without any rest he started off for Merv by way of Bandar Abbas. He was a great favourite with the whole force, and I am sure I have met few men of whom I have had such a high opinion. As a subordinate I know how

reliable he was, and I always felt that if his day ever came he would not shine less as a commander."

Gill's attempt to reach Merv was a failure. Complaints were made of British officers haunting the Russian frontier, and he was recalled. In October, 1881, the transactions of the French in Tunis having attracted his attention towards the country between that province and Egypt, he made several interesting journeys, and collected a mass of valuable information. This occupied him until the middle of 1882, when he returned to England. Within a very short time of his arrival he received his appointment to proceed to Egypt for special service, and, as has been recorded in the history of the campaign of 1882, was murdered in the desert.

Amongst the Engineers who have turned their attention to the work of exploration, the honoured name of Charles George Gordon must not be omitted. Whilst he was swaying the destinies of the Equatorial Provinces of Egypt, he found time, in the interval of his political work, to make geographical investigations and discoveries. The connection of the Nile with the great Equatorial lakes was at that time very uncertain, and he was now sufficiently near them to make it an object of his ambition to clear up all doubts on the subject. He had himself already pushed forward as far as Duffli, on the Nile, and his faithful subordinate, the Italian Gessi, had traced the river into the Albert Nyanza.

Nothing, however, was even then known positively about the Victoria Nyanza.

"It was contended," wrote Gordon, "that the Nile did not flow out of Lake Victoria and thence into Lake Albert, and so northward, but that one river flowed out of Lake Victoria, and another out of Lake Albert, and that these two rivers united and formed the Nile. This statement could not be positively denied, inasmuch as no one had actually gone along the river from Foweira to Magungo. So I went along it with much suffering and settled the question."

This he did by tracking the course of the Victoria Nile from Lake Albert backwards for seventy miles to Foweira. When near Murchison Falls he wrote:—

"A dead mournful place this, with a heavy damp dew penetrating everywhere; it is as if the Angel Azrael had spread his wings over this land. You can have little idea of the silence and solitude."

Having tracked the river to Foweira, and thus ascertained the fact that it passed from the Victoria to the Albert Nyanza, he pushed forward seventy-five miles farther up the river, and by land eighty miles more in the direction of Lake Victoria. Then he returned to Cairo.

Captain Shepherd must be ranked as one of the exploring travellers of the Royal Engineers. In the year 1877 he made an adventurous journey homeward from China, through Mongolia and Siberia, following a track but little known to Europeans. He has given a very good account of his journey, making light of its difficulties and hardships; but reading between the lines, it is easy to see that these were by no means light. After leaving Pekin he pushed northwards, until he came to the great wall of China, which he thus describes:—

"The steepness and roughness of the road increase as we near the top; a short cut, with a quarter of an hour's serious scrambling, brings us to an enclosure with two gateways, which is the outlet through the inner wall. The place is desert, the wall bare of guardians, its front face, smooth and unassailable, silently excludes the outer world; on the inside steps and slopes lead up to the pathway along the ramparts, whose noble dimensions would fitly be occupied only by giants. With dogged perseverance and unbroken regularity the wall climbs hill after hill, and reaches from crest to crest; a square tower crowns each eminence. You seem to be gazing at some marvel traced by magic in defiance of earthly difficulties, or in scorn of man's weaker toil; no other signs of his presence exist to temper your imagination, nor to suggest that his patient industry is sufficient to create this wonder; all you can take in are bare hills, with the wall creeping up to the top, to dive down on the farther side, and again to rise and fall in a long sinuous line over more distant peaks."

The journey was not difficult so long as the road lay within Chinese territory. It was only when the Mongolian desert was reached that hardships really began. After passing Kalgan, it was necessary to make provision for the rough work to be encountered. Here is Shepherd's account of his desert march:—

"After dinner we make a start and travel a few hours through the night, halting at about 10 p.m. The camels are unladen, the cart propped up, and the two men stretch themselves on the ground to sleep. Next morning I wake betimes and look on the scene. There are no signs of habitation, or of any other man or beast than those of our party. My first impression is curiosity why this particular spot came to be chosen. There was, of course, no reason, the desert being like the sea is more than a phrase, and one feels the similarity almost from the start. We cross it in a general track, and where we finish we lie to; how can there be a choice when all around is alike a level green surface? It does not take long to harness and load the camels. Starting between five and six we march till ten, halt a couple of hours for breakfast, then march till sunset, halt for dinner, and again march till ten. This is the daily routine, which is changed only when very warm weather prolongs the morning halt. After the first week the camels begin to

grow leg-weary, and then, if the draught happen to be over sandy soil, the one in the shafts drops in his tracks, and it requires much twitching at his nose-string, and much assistance with a whip on my part, to induce him to get up again. . . . . During the halts they no longer care to eat; without moving from the spot where they have been seated side by side, they stretch their long necks along the ground and gravely blink their eyes, but otherwise are motionless. They get a drink of water every second day, and, for the rest, draw upon the resources stored in their humps."

He gives a description of the way in which the Mongols who were with him fed themselves:—

". . . . The iron pan, half-filled with water, is put on, and piled with joints of mutton above its rim. A quarter of an hour's boiling or steaming is a satisfactory allowance. The tongs are used for pinching the mess, which, when considered ready, is served out lump by lump, slices are cut off equal to an ordinary civilized helping. The meat is often seized by the teeth at one end, the other end of the joint is dragged by the left hand, while a knife assists in detaching a good fid, which is swallowed in a gulp. A large joint per man is consumed, and the balance is stowed away in a bag for the evening meal."

Thus he pushed his way across the desert, the monotony being at times varied by a severe storm of wind, hail, or snow, until, towards the end of September, he approached the valley of Urga. By this time his animals were nearly worn out.

"My camels lie patiently side by side; they are past attempting to improve their condition, grumbling hoarsely only when some hungry sheep browses at their wool; the scene is not one of sleep, but a picture of final rest; the earth lies under a white pall, not a tree nor tuft of grass protrudes through the covering; beyond our encampment the whole area is a blank, pure and spotless, a vast sheet from which the artist hand has chosen to exclude all signs of life and action."

After a stay of two days at Urga, where he was able to procure three fresh camels, he pushed on to Kiachta, a journey of six days. Here he entered Russian territory, being on the frontier of Siberia.

"On the 2nd October we reach Mah-ma-chin; here I must give up my Chinese passport, a splendid document three feet by two, adorned with a margin of flourishes, and setting out the names of the British minister and myself in long columns of artistic writing. I am then allowed to pass on to the Russian settlement of Kiachta, a few hundred yards distant."

From this point the journey became easier; post horses were procurable, and the travelling, though still not devoid of hardships, comparatively straightforward.

"The road generally through Siberia is abominably bad; except at bridges, where it must be banked, the road makes itself, and is nothing better than a score of cart-ruts. . . . . It must be remembered that I am writing of the main military and commercial road through Siberia."

Captain Shepherd has recorded much of interest in the remainder of his journey, but it does not call for further detail in this work.

PART IV.—BIOGRAPHICAL SKETCHES.

Preliminary Observations.

The following biographical sketches have been compiled with the object of showing in more detail than was possible in the general history of the Corps, the work of some of those of its members who have distinguished themselves beyond their compeers. In order to prevent such sketches from assuming proportions too great for inclusion in this work, they have been restricted to the public acts of those whose career has been traced. No social details have been admitted, the biographies commencing only from the time when the subjects thereof entered the Corps.

The order in which they have been placed requires a few words of explanation. Three courses were open to me. First, to rank them in the order of their importance; second, to class them alphabetically; third, to place them in the order of their historical sequence. The last has been the one adopted, the date of the first commission in the Corps being taken as the guide. In compiling these lives, I desire to express my sense of obligation to Colonel H. Yule, R.E., to whose admirable Obituary Notices of deceased Engineers which have from time to time appeared in the pages of the "Royal Engineer Journal," I am indebted for many of the sketches of Officers of the Indian branch of the service. The life of General Skinner has been abridged from one sent to me by his descendant, Captain Monier Skinner, R.E.; and that of Sir John Burgoyne has been greatly taken from the valuable work of Major-General the Hon. George Wrottesley. I would also acknowledge my obligations to Sir Lawrence Jones, who has kindly permitted me to make use of an autobiography of his grandfather, Sir John Jones, printed only for private circulation. One curious point may be mentioned with respect to this autobiography, viz., that it is written in the third person.

In the case of three of the lives, I have allowed myself larger space than was possible for the remainder. They form what I may term the Trilogy of the Corps. Sir John Burgoyne, Lord Napier

of Magdala, and Major-General Charles George Gordon stand out so pre-eminently above their compeers, that it was only fitting their respective careers should be dealt with in some detail.

I have omitted from the list those who are yet alive, and to this I have made but one exception, viz., Lord Napier. To have produced a series of Engineer Biographies in which that honoured name found no place would have been an unpardonable omission, and in this instance I have broken through the rule. As regards the remainder, and they are many, who have earned distinction, but who are still with us and prepared to do further good work, I feel that it will be well the record of their services should await the completion of their respective careers. In most cases what they have done is recorded under one of the several heads under which this work is divided, and does not seem to call for further detail.

Many of the names of those who were at the head of the Corps in its earliest days find no place in these sketches. Of some of them, such as Sir Charles Lloyd, Sir Bernard de Gomme, and Sir Martin Beckman, little has been recorded from which to compile even a brief biography; whilst of others, such as Armstrong and Lascelles, the principal incidents of their respective careers are told in Part I.

Doubtless many names have been omitted which should find a place in these pages, and differences of opinion will arise as to the merits of some of those who have been selected for notice. Still it is hoped that on the whole a fairly just choice has been made, and that in the record of so many valuable lives, the Corps will be found not unworthily represented.

Brigadier-General HOLCROFT BLOOD

was son of the notorious Colonel Blood, who in the reign of Charles II. endeavoured to steal the Crown jewels from the Tower. He served on board the English fleet in the second Dutch War in 1672-3, and afterwards became a cadet in the French Guards. There he began the study of fortification, in which he obtained so great a proficiency that, when in 1688 James II. formed an Ordnance Train as part of an army to resist the threatened invasion of the country by William of Orange, Blood was appointed Captain of the Pioneers.

After the Revolution, William III. placed him on the Establishment as an Engineer, and in 1696 raised him to the position of

Second Engineer of Great Britain, over the head of Jacob Richards, who till then had been his senior (*vide* Part I., Chapter III., p. 60). He did good service as an Engineer in the Irish war of 1690-1, where he showed much ability at the sieges of Athlone and Limerick. He was in consequence made Major in Seymour's Regiment (the 24th). He was promoted to be Lieutenant-Colonel in Sir Matthew Bridge's Regiment (the 17th), in consequence of distinguished service as an Engineer at the siege of Namur in 1695.

When the war of the Spanish Succession broke out, Colonel Blood was placed in command of the Ordnance Train which formed part of the Duke of Marlborough's army in the Low Countries. His services in the campaigns of that great General have been referred to in Part I., Chapter VI.

Cannon, in his "Historical Record of the 17th Foot," states that Blood resigned the office of Second Engineer of Great Britain, which he had held for some years, in order to assume the Colonelcy of the 17th Regiment, and the command of the British Artillery. This is not accurate. Holcroft Blood was still an Engineer when he held those posts. His Colonelcy of the 17th Regiment was given to him as the only means then existing of increasing his military rank, and his command of the Artillery arose from his being Colonel of the Train as above recorded. That he was still holding his position as an Engineer is proved by the following entry:—"October 21st, 1704. Colonel Blood, our Engineer, with eighteen cannon and three regiments of foot, marched the 20th from our army, &c. &c." (Luttrell V. 478); and later on, after the Battle of Ramilies, where he commanded the Artillery, as he had done at Blenheim, he received a special letter of thanks from the Board of Ordnance, dated June 4th, 1706.

As a proof that this was addressed to him as an Engineer may be cited the fact that three months afterwards, viz., September 12th, 1706, the Board again addressed him to thank him for his account of the siege of Menin, "and that he acquaint the Sub Engineers that the Board expects they should make Draughts of all Towns, Sieges, &c., in all the Campaigns they have been in." This proves that they were under his command, which could not have been the case had he not still held his position as an Engineer.

Blood was promoted Brigadier for his good service at Blenheim. "He was at last advanced to the rank of Brigadier-General, and stood as fair for promotion as any other officer in the army." (Boyer's "Annals, 1708," 381.) He died at Brussels on August 19th, 1707.

Lieutenant-General WILLIAM SKINNER

was appointed Practitioner Engineer in 1719. In 1722 he was sent to Minorca, where extensive fortifications were in course of construction, and where he consequently received a professional training, which afterwards proved of the utmost value to him. Two years later he was sent to Gibraltar, being selected to assist Jonas Moore in the first survey of that place. After this was completed he returned to Minorca, but in 1726 he was again sent to Gibraltar, the fortress being threatened with attack. He served in the siege of 1727, and for his good conduct the Governor awarded him additional pay. He had been promoted Sub-Engineer in 1726, and became Engineer Extraordinary in 1730. In 1736 and 1738 he acted as Chief Engineer at Gibraltar, and we find him corresponding with the Board of Ordnance. During this time he made several views of the Rock, some of which are preserved in the British Museum, and others are at the Royal Engineer's Institute at Chatham, having been presented by Major Skinner and his son, Captain Monier W. Skinner, R.E. He was made Engineer in Ordinary in 1739, and in July, 1741, he was appointed Chief Engineer of Gibraltar. His promotion at this time was very rapid, as he was named Sub-Director in 1743, and Director in 1746.

In the latter year, when the Scotch Rebellion was crushed, the Duke of Cumberland applied to the King for an Engineer of high standing to construct such fortresses as would thoroughly control the disaffected Highlanders. Orders were consequently given to the Master-General to name a skilful officer for this duty. Skinner was selected and recalled from Gibraltar, where he had served for eighteen years. During several years after this time he was employed in restoring forts that had been demolished by the rebels, and in building new ones in suitable localities. Oliver's Fort, and Fort Augustus, Inverness, Dumbarton, Edinburgh, Braemar, and Corgarf Castles, and Fort George, all bore traces of his masterly designs.

On May, 14th 1757, he received his commission as Colonel and Chief Engineer of Great Britain.

In 1758, Lord Tyrawley, late Governor of Gibraltar, was called before the bar of the House of Commons for explanation of certain charges brought against him as to works which he had ordered to be carried out at Gibraltar while Governor, which works were useless, and not approved by his Chief Engineer (Major Green). On this the House directed that a report and opinion

by the Chief Engineer of Great Britain should be furnished. Skinner's report was very unfavourable to the unfortunate attempts at amateur engineering on the part of Lord Tyrawley, and he was then called to the bar of the House to substantiate the opinions expressed therein.

He was promoted Major-General in 1761. His duties as Chief Engineer at this time involved the conduct of fortifications at Milford Haven, Portsmouth, and Plymouth; and in 1761 he was sent to Belleisle, then recently captured, to report on its defences. In 1770 some designs and estimates for works at Gibraltar having been sent home by Colonel Green, they were referred to Skinner, who forwarded his report thereon with the following covering letter:—

"Greenwich, 30th August, 1770.

"Right Honble. and Honble. Gentlemen,

"In consequence of your orders, I have considered and examined Lieut.-Colonel Green's projects and reports on the present state of the works at Gibraltar, and herewith enclose my opinion and report of same. Lieut.-Colonel Green has been very exact in his account of this place. I speak by my own knowledge, there is hardly fifty yards that doth not vary in the advantages or disadvantages for or against the attacker. And I cannot help adding that an Engineer, to understand and know this place, must not only reside there for some time, but he must not be idle and remain in his quarters when there. For the man that designs to make himself master of the defences of this place must be perfectly acquainted with every rock, every precipice, and every fort and foible on the mountain, to be ready on a call for its defence, as well as a knowledge of the round or circuit of the walls. This knowledge of the mountain cannot be obtained but by great labor as well as time; the different precipices vary in their nature so very much that they may easily deceive a passenger, and appear in a very different light at first sight to what they would do on his closer examination of them, both within and without. For I do conceive, and I think I can affirm, that there is not a known place that is so peculiarly circumstanced and situated in Europe as Gibraltar is, and which with a proper garrison may be so advantageously defended."

On April 30th, 1770, Skinner was promoted Lieutenant-General. Among his later works and projects were those for enlarging the Gun Wharf at Plymouth and erecting new magazines; also for remodelling and augmenting the Lines at Chatham. During his lengthened service he received the Freedom of the following cities: Inverness, Edinburgh, Stirling, Perth, Aberdeen, and Athlone.

He died at Crooms Hill, Greenwich, while still Chief Engineer of Great Britain, in 1780, in the 81st year of his age. He was

buried at St. Alphege Church, Greenwich. The slab over his grave bears the following inscription :—

To the Memory of
Lieutenant-General William Skinner,
who died the 25th day of December, 1780,
having served sixty-one years an Engineer,
twenty-three of which Chief of Great Britain.

GEORGE AUGUSTUS ELIOTT,

Lord Heathfield of Sussex and Baron Gibraltar,

was born in Roxburghshire in 1718, and was the eighth son of Sir Gilbert Eliott, Bart. His education at the French military school of La Fere turned his attention to the study of Engineering science, though it was not till some years later that he joined that branch of the service. His first military duty was as a Gentleman Volunteer in the Prussian army. On his return to Scotland in 1735, he was attached in a similar capacity to the 23rd Royal Welsh Fusiliers under Lieutenant-Colonel Pears. In 1739 he joined the Woolwich train as a cadet gunner, and after passing through the usual course of instruction at the Warren, he was commissioned as Second Lieutenant in the Royal Artillery in 1740, with the warrant of fireworker, in order to join the expedition to the West Indies, which was to act in conjunction with the fleet under Admiral Vernon. He saw some service in that capacity, and in the year 1741 he was transferred to the Engineers as a Practitioner under date July 1st. Returning from the West Indies, he was made Adjutant of the Scots Troop of Horse Grenadier Guards, and with that regiment accompanied George II. to Flanders. In this campaign he did double duty as a cavalry officer and as an Engineer. In the following year (1743) he was at the battle of Dettingen, where he was wounded, having greatly distinguished himself. He was promoted Engineer Extraordinary on March 8th, 1744, and in 1745 was present at the battle of Fontenoy, where he was again wounded. In 1747 he was commissioned as Lieutenant-Colonel in his Troop of Horse Grenadier Guards, having in the same year become an Engineer in Ordinary. He was now stationed at Sheerness as Second Engineer of the Medway Division, where he performed the usual duties of the Corps. He continued at this post till the year 1750,

when he appears once more to have returned to the more congenial duties of a cavalry officer, his corps having become, through his incessant care, one of the finest in Europe. He greatly attracted the notice of George II., who made him one of his Aides-de-Camp and promoted him to the rank of Colonel. In 1757, the Corps of Engineers being remodelled, and military rank attached to grades, Eliott was by his position as an Engineer in Ordinary only able to claim the rank of Captain, he being at the time a Colonel in the army. This he declined to accept, and resigned his position in the Corps. His career had so far been wonderfully varied, he having served in the Infantry, Artillery, Engineers and Cavalry. The latter was undoubtedly that which he loved best, and after he had shaken off the trammels of an Engineer he devoted himself to it exclusively. He was appointed Brigadier in the expedition to France in 1758, and placed in command of the Brigade of Light Cavalry. In the following year he was commissioned by the King to raise a regiment of Light Cavalry, which was numbered as the 15th Light Horse, but was better known as Eliott's Light Horse, a title it still popularly bears. It formed part of his Brigade on the first occasion of its going into action at the battle of Emsdorf in 1760. He was made a Major-General in 1759, and a Lieutenant-General in 1761. In the following year he served as second in command in the expedition to Havannah under the Earl of Albemarle, and bore a distinguished part in the siege of that place.

In 1775 he was appointed Commander of the Forces in Ireland, but did not remain there long, having had a serious disagreement with the Lord-Lieutenant. He was then given the Governorship of Gibraltar. What he did at the great siege of that fortress in 1779-83 has been already described. After the conclusion of peace he returned to England, where, in consideration of his eminent services, he was created Lord Heathfield of Sussex and Baron Gibraltar, and awarded a pension of £2,000 a year for two lives. He died of apoplexy at Aix la Chapelle in 1790. General Eliott was one of the most abstemious of men; his diet consisted of vegetables, biscuit and water, and he rarely slept for more than four hours at a time. It was, therefore, said of him, that he was eminently suited to conduct the defence of a beleaguered fortress, as he could be neither surprised nor starved into submission.

Colonel PATRICK MACKELLAR

received the Warrant of a Practitioner Engineer in 1742, and in 1744 was promoted Engineer Extraordinary, without passing through the intermediate grade of Sub-Engineer. All his early service was spent at Minorca, then a station as much prized as Gibraltar. Several of his plans connected with this island are preserved in the War Office.

In 1751 he was promoted to be Engineer in Ordinary. During his eighteen years' residence at Minorca, he was engaged in developing the defences of St. Philip's, and completing that vast mass of subterranean defence which had been begun by Petit and Durand, and extended successively by Horneck, Hargrave, and Thomas Armstrong.

In 1754 he was called home to join the expeditionary force of General Braddock to North America. He served through the ill-fated campaign of that General, and was present at the disastrous battle of Du Quesne, where Braddock was killed and the army nearly annihilated. In this fight Mackellar was severely wounded. Having lost his horse and baggage, he received compensation to the amount of £183.

In 1756 he took part, as Chief Engineer, in the defence of Ontario and Oswego, and after a gallant struggle in both cases, was taken prisoner at the surrender of the latter. Mackellar was removed by his captors to Quebec and Montreal, and although all the time subject to close restraint and treated with great inhumanity, he contrived to make himself acquainted with much in both fortresses, which proved afterwards to be of immense value. Being exchanged in 1757 he returned to England, where for a time he was employed in repairing many of the castles, forts, and batteries in Scotland. A plan of Drumsin, drawn by him at this time, is preserved in the British Museum. He received the rank of Captain in this year like the rest of the Corps. Before that date he had held no military position.

In 1758 he was promoted Sub-Director and Major, and attached to the army under Wolfe as Second Engineer to Bastide. On June 8th he was in the action at the landing on Cape Breton, and also at the siege of Louisburg, in which, after Bastide was wounded, he conducted the operations.

When that officer left the army in May, 1759, Mackellar was appointed Chief Engineer, and as such carried on the siege of Quebec, where he was severely wounded. He was the only Engineer in whom Wolfe seemed to have any faith, and whose

judgment or opinion was ever favourably quoted by that General. He was present at the battle on the Heights of Abraham, his account of which has been given in Part I., and he was also at the action of Silleri, where he was severely wounded, and in the subsequent successful defence of Quebec against the French. He was unable, owing to his wound, to take a personal part in the earlier days of the siege, but he had sufficiently recovered to conduct the concluding operations. He afterwards shared in all the actions which completed the conquest of Canada, including the capture of Montreal. He then proceeded to Halifax, which had become the great depôt and arsenal for the troops in North America. Here he superintended the improvement of the defences and the erection of store-houses, &c. A lengthy report on the defences of Halifax, with designs for their increase, illustrated by numerous plans, was sent home by him and reached the Board of Ordnance early in 1761, but is no longer in existence. One of the plans, showing a project for works on Citadel Hill with contours and sections, is, however, still at the War Office.

In the winter of 1761, Mackellar took part in the expedition to the West Indies as Chief Engineer, and was present at the capture of Martinique, and afterwards at the siege and capture of Havannah. He then returned to England for the recovery of his health, which had been greatly shattered by his exertions in the unhealthy climate of Cuba.

When Minorca was restored to England by the treaty of peace in 1763, Mackellar was appointed Chief Engineer there, and took over the fortifications, store-houses, &c., from the French. The following years were spent by him in restoring the works, adding to their extent, and building barracks. During this latter period of his life he suffered acutely from the wound he had received at Silleri, the ball never having been extracted, and at times causing him the most intense suffering.

On August 29th, 1777, he was promoted to the rank of Director and Colonel, but he did not live long to enjoy the enhanced position thus gained. In the midst of his labours for the benefit of the island he was struck down, and died on October 22nd, 1778. More than forty years of his life had been spent in active service; he had been four times wounded, and once taken prisoner. He had successfully conducted some of the most glorious sieges of the period, and had earned for himself a name which was everywhere recognized. It is painful to have to record that he never received a single mark of favour, distinction, or honour. His steps were only gained slowly and by seniority, and after a brilliant and lengthy career he died as a Colonel only.

Major-General DAVID WATSON

was appointed Sub-Engineer in 1743, passing over the lower grade of Practitioner altogether. The probable reason for this was that he had already seen considerable military service. As early as 1733 he had been gazetted a Lieutenant in the 25th Foot, and in 1742 he went with his regiment to Flanders. He was shortly afterwards attached to the Ordnance Train as a local Engineer. In this position he was present at the battle of Dettingen, and after that event he was placed permanently on the establishment as a Sub-Engineer. In 1745 he was at the battle of Fontenoy, and subsequently took part in the defence of Ostend until its surrender. By the terms of the capitulation he was permitted to rejoin the army under the Duke of Cumberland. He had meanwhile been promoted Captain in the 21st Fusiliers, then called Panmure's Regiment.

On his return from Flanders he went to Scotland, where he was engaged in putting down the rebellion of 1745. In the early part of 1746 he was promoted Lieutenant-Colonel in the Army, although at the time still only a Sub-Engineer. He was present at the siege and capture of Carlisle, and at the battle of Culloden.

In the beginning of 1747 Watson was made Engineer Extraordinary. At this time he was already engaged in the preliminary stages of the Scotch Survey, a work which was destined to be so intimately connected with his name. Shortly afterwards he was appointed Chief Engineer and Superintendent of the Survey, and a brigade of Engineers was told off to be under his orders. With this Survey was combined the development of the project of Marshal Wade for constructing roads through the Highlands, and connecting them with the low country. All these were laid out by Watson, and formed under his supervision.

In 1752 he received the Warrant of an Engineer in Ordinary. For some years prior to this he had held the Staff appointment of Deputy Quartermaster-General of Scotland, but the exact date at which he first assumed the duties of this office is not known.

He was for nine years engaged in the Scotch Survey, and the result of his labours, assisted by Dundas and Roy, is to be seen in the elaborate series of maps now in the British Museum. When this duty was completed, he was employed in ordinary Engineering work. In 1756, in consequence of an Address from the House of Commons, he was sent by George II. to Milford Haven, to survey the district and project works of defence. In this year he was made Quartermaster-General in Scotland, with the rank of a Colonel of Foot, and in the following year, in company with

the other officers of the Corps, he received the commission of Captain, due to his grade of Engineer in Ordinary.

The high position held by Watson in Scotland seems to have created some jealousy. We see this in a letter written by General Wolfe to his friend Rickson, then Deputy Quartermaster-General under Watson :—

"I heartily wish you fixed in the employment you now exercise, but if David Watson is not misrepresented you have every thing to fear from his artifices and double-dealing. I wish I was strong enough to carry you through, I'd take you on my back, but my people are away. Calcraft could save you—no man better. He is the second or third potentate in the realm. I may have an opportunity of speaking to Napier, but there Watson governs alone, and we are not sharp enough to dart into the hearts of men. The nephew goes with us." (This was Roy, who was Watson's nephew, and was to accompany Wolfe on the Rochfort expedition). "I must have succumbed under the weight of some characters of this sort if I had not stood out in open defiance of their wicked powers. A man will not be ill-used that will not bear it."

Wolfe through his whole career had been antagonistic to the Engineers, and he never lost an opportunity of showing his ill-feeling towards them. His opinion of Watson does not seem to have been shared by others quite as competent to judge as himself, for we find that officer rising steadily in rank and reputation. On April 21st, 1758, he was given the Colonelcy of the 63rd Foot, and in 1759 became Major-General. In this year he served with the allied army on the Rhine as Quartermaster-General on the Staff of Lord George Sackville, and was present at the battle of Minden. For his services on that occasion he was thanked in the orders of the following day. In 1760 he was transferred from the command of the 63rd to that of the 38th Regiment. This is the last record of Watson that can be traced, as on November 7th, 1761, he died, whilst still but little past middle age. His services with the Engineers closed when he was appointed to the command of the 63rd Regiment, on which occasion he resigned his position as Engineer-in-Ordinary.

Major-General JAMES BRAMHAM

was appointed Practitioner Engineer in 1744. Previous to this he had served as a Draughtsman for four years at Gibraltar. In 1745 he joined the army in Flanders, and was present at the battle of Fontenoy. Returning home at the close of the campaign he was sent to Scotland, where the Rebellion was still in progress.

After its suppression he went to Scarborough to restore and improve the castle and barracks.

In 1747 he was once more ordered to the Low Countries, and was present at the actions of Roucoux and Val, and took part in the defence of Bergen-op-Zoom. In 1748 he was promoted Engineer-Extraordinary, passing over the grade of Sub-Engineer. No record can be traced as to the reason for this measure, the result of which was to place him over the head of several of his contemporaries. He, like others of the Netherlands Engineers, was engaged after the peace in surveying part of that country, in which he was assisted by William Bontein, a Practitioner Engineer. The portion allotted to him was the town of Breda, with its fortifications and environs. The plans which he and Bontein drew are now in the British Museum. After a short service in North America, he was selected, in 1755, by special order of the House of Commons, to be one of three Engineers to proceed to the West Coast of Africa, for the purpose of surveying the military stations, under the direction of Justly Watson, the senior of the three. This duty accomplished, Bramham returned without having suffered from the pestilential nature of the climate. In 1756 he was promoted Engineer in Ordinary, and in the following year received, with the other officers of the Corps, the commission due to his Engineer grade, viz., that of Captain.

In the summer of 1756 he was sent to Jersey, which was at the time threatened with invasion. He was commanded by the King to draw up a project for its defence. This service he finished before the end of the year, and the designs prepared by him are now in the King's Library at the British Museum. They were approved by the Council and ordered to be carried into execution under Bramham's superintendence. For this purpose he remained in the island until the end of 1758. After having been stationed for three years at Milford Haven, carrying out the fortifications then being erected at that point, he was, in 1761, attached as Chief Engineer to the expedition of General Hodgson, for the capture of Belleisle, the success of which was greatly due to his exertions. He had early in the year been promoted Sub-Director and Major.

In 1762 he was given the rank of Lieutenant-Colonel in the army, and on returning from Belleisle reverted to the ordinary peace duties of the Corps, in which he was engaged at various stations for the next fifteen years. In 1776 he was promoted to Director, and in the following year was made Colonel in the army. He was at the same time appointed Lieutenant-Governor of the Royal Military Academy at Woolwich, a post which he held until 1781, when he was raised to the position of Chief Engineer of Great Britain, on January 24th, in the place of

General Skinner, recently deceased. In October of this year he became Major-General. He held the office of Chief Engineer until his death. During that time many important questions were dealt with by him. Amongst others, the difficulties arising from the engineering projects of the Duke of Richmond. These have been touched on in the Chapter on the National Defences, and need not be further referred to. He was one of the members on the Board of naval and military officers ordered to report on the proposed defences for Portsmouth and Plymouth in 1785, and in the same year he was made President of the Engineer Committee at the Tower. He died on November 11th, 1786.

General Sir WILLIAM GREEN, Bart.,

was appointed a Practitioner Engineer in 1744, having six years previously received a Warrant as a cadet-gunner, when he took his place in the ranks of the Train for manual exercises, and completed his terms at the Warren of Woolwich for theoretical instruction in gunnery, fortifications, mathematics, and drawing.

In 1745 he joined the Ordnance Train in Flanders, and was present at all the actions of that year, including Fontenoy. In 1746 he was present as a junior officer in the futile attack on L'Orient under General St. Clair, and subsequently in the equally unsuccessful descent on Quiberon. In 1747 he returned to Flanders, and was wounded at the battle of Val. He was afterwards one of the Engineers at the defence of Bergen-op-Zoom, and drew a series of plans of this fortress, which are still in the British Museum; they bear the date of 1751.

He was selected with some other Engineers to remain after the conclusion of peace, to make a survey of the Austrian Netherlands. That portion of the country which lies between Bois-le-Duc and Gertruydenberg was assigned to him, and Harry Gordon, the Practitioner Engineer, was named as his assistant. Whilst engaged on this duty he visited Luxemburg, and made a careful plan of the mines and galleries of that fortress. This and his other surveys are in the King's Library at the British Museum. He was promoted Sub-Lieutenant in January, 1748.

On his return from survey duty he was stationed at Portsmouth, where he remained till 1750, when he was removed to Landguard Fort under Director Justly Watson. It was there that he made acquaintance with the daughter of that officer, whom he married in 1754. This is the lady whose diary during the siege of Gibraltar has been so freely quoted in Part I., Chapter V. The next few years of his life were uneventful. In 1753 he was

made Engineer Extraordinary. Like the other officers of the Corps, he received a Commission as Captain-Lieutenant in 1757, and in the following year was promoted Engineer in Ordinary and Captain. Green served in the campaign in North America under General Abercrombie in 1758, and at the capture of Quebec, under Wolfe, in 1759. In the attack on the enemy's intrenchments at Montmorenci, he was severely wounded in the forehead by the splinter of a shell. He recovered from this in time to take part in the final operations for the subjugation of Canada, including the taking of Montreal. Whilst before Quebec he was promoted Sub-Director and Major on September 10th. In the following year he was present at the battle of Silleri, and the defence of Quebec when besieged by the French. This campaign over he returned to England, and was shortly afterwards sent to Gibraltar as Chief Engineer, in succession to Archibald Patoun.

Green at this period was about thirty-five years of age, and one of the ablest officers in the Corps. He had had the advantage of uninterrupted employment as an Engineer. He had never combined his duties as such with service in any regiment, as had been the case with many of his brother officers. The Board of Ordnance took care always to keep fully employed all officers who, like Green, were free from the divided liability consequent upon regimental service, and he had reaped the benefit of so much practical experience. He was, therefore, peculiarly suited for the post of Chief Engineer of Gibraltar, where his high attainments, ability as a designer of works, and soldierly qualities were likely to be called into full play. The result proved the wisdom of the selection. Energetic and experienced, he was always busy, and in time grew to know every detail of the fortress. Each year saw new projects, extensions of some existing works, and renovations of others. It was marvellous how much he accomplished, assisted as he was by the services of one Engineer only under him. He received army promotion as Lieutenant-Colonel in 1762.

In 1770 he made an elaborate report on the general works of the Rock, in which he described his designs for what he hoped would render the fortress practically impregnable. This document, which consists of fifty-seven pages accompanied by many plans, is in the British Museum: it was the scheme on which the Chief Engineer, Lieutenant-General Skinner, wrote the laudatory letter which has been quoted in the Biographical Sketch of that officer. It included the erection of the Montagu, King's, and Prince of Orange's bastions, with various other new works, and the estimate amounted to £51,126. The favourable opinion of General Skinner induced the King to sanction the outlay, and the design was carried out accordingly.

In 1777 Green was promoted Colonel in the army. At this time, the Governor, feeling that an attack on the fortress was imminent, sent Green to England, hoping that the personal representations of an officer of his admitted ability would have more weight in urging the necessity for additional outlay than could be effected by correspondence. Green took with him a confidential letter to Lord Townshend, and during his stay in England was in frequent communication with the Ministry as well as with the King. He embodied his proposals in a paper of "Considerations upon the present state and strength of Gibraltar, referring occasionally to its condition as reported in 1770, also describing the powers and properties of the additional works and alterations executed since that period, and likewise the new works still thought necessary to be added, and old works to be altered." This report he submitted on April 10th, 1778, accompanied by seven plans.

He received full powers to carry out his proposals, and returned to Gibraltar in May. At the end of the year he was promoted to the rank of Director. Meanwhile every effort was made by him to execute the additional works for which he had obtained sanction, and many of them had been erected when the Spaniards invested the place.

A full account of this celebrated siege and of Green's share therein having been given in Part I., Chapter V., no allusion to it need be made here. It has already been recorded that during the lengthened period of its continuance he received the successive steps in rank of Brigadier-General and Major-General, and that for his eminent services he was further created a Baronet. It may be mentioned that he was the first Engineer officer who ever received the thanks of Parliament by name.

In 1786 he was made Chief Engineer of Great Britain, in succession to Major-General Bramham, and continued to hold that office till old age and infirmity compelled him to resign it in 1802, when he retired on a pension. He had been promoted Lieutenant-General in 1793, and General in 1798. He lived until 1811 at Bramblebury House, Plumstead, Kent, and on his death, at the beginning of that year, he was buried in the churchyard of the parish. Over his remains there is a massive tomb bearing the inscription—

Interred lie the Mortal Remains of
General Sir William Green, Baronet,
Chief Royal Engineer.
Departed this life 11th January, 1811,
Aged 86 years.

This is followed by some poetry of a very feeble character.

General HUGH DEBBIEG

commenced his military career as a mattross-gunner in 1742 at the age of eleven, and in the following year became a cadet-gunner on joining the Royal Military Academy. Whilst still there he was attached as an Engineer to the expedition against L'Orient under General St. Clair, receiving the same pay as the other Engineers, viz., 10s. per diem, though at the time he was only fifteen years old. At the close of the campaign he returned to the Academy to complete his studies. He then joined the army in Flanders as a local Sub-Engineer, and was made extra Aide-de-Camp to the Duke of Cumberland. He there saw much service, concluding with the defence of Bergen-op-Zoom. After the peace he was appointed on the permanent strength of the Corps as a Practitioner Engineer in 1748. He was engaged for some time in rough military surveying in Scotland and in the North of England, and afterwards, having become a Sub-Engineer, he was employed on the defences of Chatham, several of his plans of that date being in the British Museum. When military rank was given to the Engineers, Debbieg, although only a Sub-Engineer, was commissioned as Captain-Lieutenant, probably in error, since on January 4th, 1758, when he was made Engineer Extraordinary, he was re-commissioned in a similar military rank. In the same year he was ordered on active service to America under General Amherst, and was appointed Assistant Quartermaster-General. General Wolfe seems to have been much struck by his gallantry and resources at the siege of Louisburg, and from that moment took him in hand. He served under Wolfe during his campaign, and was present at the sieges of Quebec, including the battle on the plains of Abraham, in which that General was killed. Debbieg appears among the group in West's painting of the Death of Wolfe. He continued to serve throughout the American war with much distinction until the subjugation of Canada was completed by the capture of Montreal. In 1762 he accompanied Colonel Laurence, who was sent with a small force to recover Newfoundland, which had recently been seized by the French. This was successfully accomplished. In 1764 he came back to England, where he remained two years, during which time he was much engaged in discussing plans for the defence of Newfoundland. In 1766 he returned there in order to design the necessary works, receiving an allowance of 50s. per diem while so engaged. He remained a year in the island, and then brought home his plans, and estimates amounting to £72,000. These were much discussed and debated on; and after no less than

seven years had been wasted in deliberation, they were sanctioned almost in their entirety and carried out.

In 1767 he was sent on a secret mission to inspect and report on various seaports in France and Spain—a difficult and dangerous task, in the performance of which he ran many risks and underwent much hardship. He was nearly two years engaged in this work, the results of which are shown in a manuscript book in the British Museum, called "Remarks and Observations on several Sea-ports in Spain and France during a Journey in those Countries in 1767-8." For this he received by Royal Warrant a secret mission pay of 40s. a day, besides a permanent pension of 20s. a day from the King. His next important service was as Chief Engineer at Chatham in 1778, when he commenced carrying out the lines of defence as designed by Desmaretz and improved by Skinner. Many additional works were at the same time designed by himself, which he also executed. Debbieg was a man of very strong will, of great genius, and undaunted resolution and perseverance. He was wont to express his views with a straightforwardness and decision which rendered him more respected than popular, and during this period of his service he seems to have been in consequence frequently in hot water. During the riots of Lord George Gordon he was employed in the defence of the Bank of England, the British Museum, and the various public offices, and he succeeded in warding off the attacks of the mob.

Debbieg remained for many years in charge of the construction of the Chatham defences, and during that time had many a wordy warfare with the authorities. Indeed, it is wonderful that he was permitted so much latitude, and this can only be accounted for by the fact that his sterling qualities and great engineering talents were in reality warmly appreciated. At length he overstepped the bounds of long-suffering even of the Duke of Richmond. Feeling himself aggrieved by the position in which he was placed under the new Warrant issued by the Master-General, he wrote most bitterly and in a very insubordinate tone both to him and to the Chief Engineer. For this he was brought to a court-martial, as is alluded to in Chapter V., Part II., and sentenced to be reprimanded and to make submission to the Duke. Having done this, apparently no further notice was taken of the incident. He then, in his irritation, applied to be placed on the Invalid Establishment. This the Duke declined to do, alleging that on the ground of age, energy, attainments, and fame, he believed he would render effective service to the King in any clime.

In the following year the House of Commons nominated him a member of the Board of Land and Sea Officers to consider and

report on the state of the defences of the kingdom. This, however, was opposed by the Duke of Richmond, who declined to allow him to serve. The fiery Engineer at once retorted with a letter even stronger than the one which had caused his former court-martial, and not satisfied with sending it to the Duke, he published it in the "Gazetteer." There was now nothing to be done but to bring him again to a court-martial, which was accordingly done. The Court was presided over by Lord Southampton, and Colonel Matthew Dixon of the Royal Engineers was one of the members. It sat on June 26th and 29th, 1789, and he was sentenced to be deprived of rank and pay for six months. On this court-martial the Adjutant-General remarked :—

"His Majesty, after expressing his concern that an officer of Colonel Debbieg's rank and experience should a second time have lost his sense of discipline and subordination, adverted to the lenity of the sentence, which His Majesty was graciously pleased to attribute to the opinion entertained by the Court Martial of Colonel Debbieg's former services and professional merit. His Majesty wished upon the same ground to have found an opening for the interposition of his royal clemency, but in support of good order and for enforcing a good observance of that deference and respect which officers of an inferior degree owe at all times to those who are superior to them in rank and command, His Majesty has thought it necessary to confirm the sentence of the Court Martial."

This incident is referred to in the "Rolliad," in the lines beginning—

"Learn, thoughtless Debbieg, now no more a youth,
The woes unnumbered that encompass truth ;
Nor of experience, nor of knowledge vain,
Mock the chimæras of a sea-sick brain."

* * * * *

And ending—

"Oh ! let the wiser duty then be thine,
Thy skill, thy science, judgment to resign."

* * * * *

"So shall thy comfort, with thy days increase,
And all thy last, unlike thy first, be peace ;
No rude Court Martial shall thy fame decry,
But half-pay plenty all thy wants supply."

Debbieg was made a Major-General in 1793, Lieutenant-General in 1798, and General in 1803. In 1799 he was retired by being posted to the Invalid Engineers, and in the following year the King granted him an allowance of 12s. a day in consideration of his past services. This was in addition to his Invalid pay of 18s., and his pension of 20s. a day. He died in 1810. There is no doubt that

Debbieg was a man of great gifts, and had he been blessed with a little more suavity and judgment, he would probably have left behind him a reputation far more widely extended than he did. It is very certain that, had he not been held in high admiration for his talents and services, he would not have escaped so easily from the effects of his oft-repeated fits of insubordination.

Major-General Sir ARCHIBALD CAMPBELL, K.B.,

was gazetted Practitioner Engineer and Ensign on February 8th, 1758, and promoted Sub-Engineer and Lieutenant on March 17th, 1759. Between the years 1758 and 1762 he was employed in three expeditions to the coast of France, and in the West Indies at the capture of Guadaloupe, Dominica and the neighbouring islands (*vide* Part I., Chapter VIII.). In 1763 he was promoted to the grade of Engineer Extraordinary and Captain-Lieutenant. In 1767 he was sent to the East Indies, where he served as Chief Engineer of Bengal till 1775, with the local rank of Lieutenant-Colonel. On April 1st, 1771, he, in company with other Engineers who were stationed in India, was removed from the home establishment and transferred to the books of the East India Company. His career as an Indian Engineer was a brilliant one, and gained him a high reputation. Fort William, the citadel of Calcutta, was constructed from his designs, as well as several other important works. During this time he was enabled, like so many others, to amass considerable wealth, with which he returned home in 1773, and henceforward his connection with the Engineers entirely ceased.

He went into Parliament as member for the Burghs of Stirling in 1775. On the outbreak of the American rebellion he raised at his own expense a regiment of Light Infantry, which was named the 71st Regiment of Highlanders, and of which he was appointed Lieutenant-Colonel.

He set sail with his regiment in May, 1776. The calamity which then befel him may be best given in his own words in a report to General Howe, dated June 19th, 1776 :—

"On the 16th June the *George* and *Annabella* transports, with two companies of the 71st Regiment of Highlanders, made the land of Cape Anne after a passage of seven weeks from Scotland, during the course of which we had not an opportunity of speaking to a single vessel that could give us the smallest information of the British troops having evacuated Boston. On the 17th at daylight we found ourselves opposite to the harbour's mouth of Boston, but from contrary winds it was necessary to make

several tacks to reach it. Four schooners, which we took to be pilots or armed vessels in the service of his Majesty (but which were afterwards found to be four American privateers of eight carriage guns, twelve swivels, and forty men each) were bearing down upon us at four o'clock in the morning."

Then follows a short description of the engagement, at the close of which the enemy bore away.

"As my orders were for the port of Boston I thought it my duty at this happy crisis to push forward into the harbour, not doubting I should receive protection." . . . . "As we stood up for Nantasket Road an American battery opened upon us, which was the first serious proof we had that there could scarcely be many of our friends at Boston, and we were too far embayed to retreat."

The four vessels that had attacked them in the morning, with the addition of two others, now once more engaged them—

"Although the mate of our ship and every sailor on board, the captain only excepted, refused positively to fight any longer, I have the pleasure to inform you that there was not an officer, N.C.-officer or private man of the 71st but what stood to their quarters with a ready and cheerful obedience."

The fight went on till all their gun ammunition was exhausted, when they were compelled to surrender. He concludes his letter by dilating upon the good treatment and civility shown him by the people in power at Boston. This, however, did not last long, for on February 14th, 1777, he addressed a letter to Sir William Howe, in which he gives a piteous description of the treatment he was receiving in the common gaol of Concord—

"because his Excellency had refused to exchange Genl. Lee for six field officers, of whom I happened to be one, and that your Excellency had put that officer under custody of the provost."

As a matter of fact, General Lee was to have been tried and executed as a deserter, and the ill-treatment of Campbell and others was the consequence. The upshot was that Lee was eventually placed in the position of a prisoner of war, and the rigour of Campbell's treatment much mollified. He was at length exchanged, and arrived in New York in May, 1778.

In the winter of that year he was placed in command of an expeditionary force for the conquest of Georgia. In this he was completely successful; the enemy was driven out and the province occupied within three months.

In 1780 he was appointed Lieutenant-Governor of Jamaica, and two years later Captain-General and Governor-in-Chief of the island. Here he performed his functions so much to the satisfaction of the inhabitants that on his departure he was presented

with a very handsome service of plate. In 1785 he was appointed Governor of Madras.

"This day, October 17th, General Campbell set sail from this port in the *Earl of Talbot* Indiaman, for the Government at Madras."—("Gentleman's Magazine," 1785, p. 829.)

Prior to his departure his Majesty created him a K.B. He remained at Madras till 1789, when he resigned the Government on account of ill health. He had in fact never recovered the rigorous two years' confinement, when a prisoner of war in America. This, however, was possibly not the only cause of his return home, for we read in the "Gentleman's Magazine":—

"Sir Archibald Campbell arrived in the *Manship* Indiaman on the 18th June off the Lizard. He sailed from Madras on the 7th February. . . . . The dissention which has for a long time subsisted between Earl Cornwallis and Sir Archibald Campbell is the cause that the latter resigned a situation which he could not honourably hold consistent with his own feelings."

His term of government seems to have been on the whole a very brilliant one:—

"To protect a weak and extensive frontier, to discipline a detached army, and to provide resources in a lately desolated country, fell to the lot of Sir Archibald Campbell. Skilled in every branch of military science, with knowledge matured by experience in various countries and climates, indefatigable in all public duties, and endued with a degree of worth and benevolence which attached to him all ranks in the army, and excited voluntary exertion in every officer to second the zeal of his general, he had a task to perform which, though great and complicated, was not beyond the reach of such distinguished talents. Granaries were established on the frontier and other stations in the Carnatic, containing supplies for near 30,000 men for twelve months, and furnished in such a manner as to provide against the exigencies of famine or of war without incurring additional expense to the public; a complete train of battering and of field artillery was prepared far surpassing what had ever been known upon the coast; a store of camp equipage for an army of 20,000 men was provided; the principal forts were repaired and more amply provided with guns and stores; the cavalry were with infinite difficulty completed to their full establishment, and a general uniformity of discipline and movement was established in the Cavalry, in the Infantry, and in the Artillery. During the government of Sir Archibald Campbell, the revenues of the Presidency of Fort St. George, including the acquisition of the Guntoor circar, and the additional subsidy from the Nabob of Arcot were increased from £960,000 to £1,400,000 a year." . . . .—(Dirom's "Narrative of the Campaign in India," 1793.)

On his return to England he met with the most flattering

reception from the King, and was at once re-elected M.P. for the Stirling Burghs. In 1790, when a rupture with Spain appeared imminent, the Government consulted him in the most confidential manner as to the organization of the army, and offered him its chief command. This, however, he was compelled to decline, as his health had completely broken down.

On March 31st, 1791, he died at the age of 52, and was decreed a public funeral in Westminster Abbey.

"The procession consisted of twelve porters on horseback, a plume of feathers a hearse drawn by six horses, and fourteen mourning coaches, drawn each by four horses, and the chariot of the deceased. The pall-bearers were the Duke of Argyle, Earl Stanhope, Viscount Stormont, Lord F. Campbell, Sir W. Fawcett, and Mr. C. Campbell." . . . . ("Europ. Mag.," 1791, p. 319.)

A monument was erected over his remains in the north aisle of Westminster Abbey.

THE DURNFORD FAMILY.

The extraordinary fact that no less than four successive generations of this family have found representatives in the Corps of Royal Engineers, renders it appropriate that our Biographical Sketches should contain some allusion to this *par excellence* Engineer race.

Elias Durnford entered the Corps in 1759, and rose to the rank of Colonel in 1793, dying on service in the West Indies in 1794. He embarked with Lord Albemarle's expedition in 1763, and served with distinction at the sieges of Belleisle and Havannah. At the capture of the latter place he was appointed Aide-de-Camp to Lord Albemarle. For many years he was Surveyor-General of West Florida. He commanded the garrison of Mobile in 1781, when it was besieged by a vastly superior force under Don Galvez. After a gallant defence he was compelled to surrender, and with his men became a prisoner of war. He was subsequently Chief Engineer at the siege of Martinique, and at the reduction of Guadaloupe and St. Lucia in 1794. He died shortly afterwards at Tobago.

His younger brother, Andrew Durnford, was commissioned into the Engineers in 1769, ten years after Elias. He served throughout the American War from 1776, holding the Staff appointment of Deputy Assistant Quartermaster-General in Georgia and West Florida, whilst his brother was Lieutenant-Governor there. In 1785 he was appointed Chief Engineer of the Works at Chatham. A few years later he was chosen to construct

the defences of Bermuda, being the first British Engineer ever sent to the station. He died in the island in 1798, holding at the time the rank of Major.

In the next generation we have ELIAS WALKER, son of Elias Durnford, who received his commission in the Royal Engineers in 1793. He served under his father in the attacks on Martinique, St. Lucia, and Guadaloupe, in 1794, and was taken prisoner at Point à Pitre. He rose to the rank of Lieutenant-General and died in 1850.

In the third generation we have his two sons, ELIAS, who was commissioned to the Corps in 1822 and died in 1835, and VINEY, who joined in 1830 and died 1836. In this generation we also have EDWARD WILLIAM, grandson of Andrew Durnford, who entered the Corps in 1826, and is now a Colonel-Commandant and General.

In the fourth generation we have Edward's two sons, ANTHONY WILLIAM, who fell so gallantly at Isandlwana, and ARTHUR GEORGE, who is now a Colonel and Deputy Inspector-General of Fortifications.

It is believed that there will not be wanting members of this Engineer family to represent the Corps in the fifth generation.

MAJOR JAMES RENNELL, F.R.S.,

was born in 1742. He entered the navy in 1756, and served with much distinction for so young a man, in the various desultory expeditions at that time carried out against the French. His surveying powers were even then called into play, as there still exists a plan of the Bay of St. Cast, which bears the inscription, "To the Right Honourable Lord Howe, this plan is dedicated by his obedient humble Servant, J. Rennell, 1758." The "Annual Register" of 1830, in a sketch of his life, gives the following anecdote of him at this period:—Some sloops of war of the enemy being moored in shallow water, beyond reach of our guns, Rennell asked for the loan of a boat. Accompanied by one sailor only, he reconnoitred the sloops, and ascertained that he was correct in his supposition that, owing to an unusually high tide it was possible to reach the vessels. The information thus obtained was acted on with complete success, and the *Baleine* and *Hermione*, at anchor before Pondicherry, and within half musket-shot of the place, were cut out by a party, of whom he formed one. Rennell was in the division that attacked the *Baleine*, and he wrote:—

"No sooner were they boarded, and the cables cut but y^e^ garrison

was alarm'd, and y^e^ Ships received a furious cannonading from every gun that could be directed at them. . . . . The Ship that we boarded had no sails bent, so that you may imagine what we suffer'd after being exposed a full hour to the fire of y^e^ enemy. Our loss was 8 killed, and I believe 30 wounded."*

Rennell seems to have continued his surveying services throughout the time he remained in the navy, having, amongst other places, made plans of the harbours of Trincomalee and of Diego Rayes, now known as Rodrigues, an island to the eastward of Mauritius.

In 1762 Rennell joined the East India Company's service, and was despatched on a reconnoitring expedition to Manilla. Several charts prepared by him, as the result of this duty, still exist in the India Office. In 1763 he was directed to superintend the landing of troops and stores for the siege of Madura, and for this received the thanks of Government, with a handsome present. He was shortly after appointed a Probationer Engineer and Surveyor of the East India Company's Dominions in Bengal. During his service in the Bengal Engineers, Rennell was principally engaged on Survey duties. In January, 1767, he was promoted to the rank of Captain, and made Surveyor-General. By this time he had restored to order and comparative accuracy the map of Bengal, and accumulated the material which he afterwards utilized in the first approximately correct map of India, which he compiled. During this time he had many serious adventures and hairbreadth escapes. One of these he describes in a letter dated August 3rd, 1766:—

"The next morning early we" (he and a small body of native soldiery) "pursued the Enemy" (a body of Faqueers), "and continued the pursuit till four in the afternoon, at which time two other Officers and myself went to reconnoitre a Village, altho' we hardly believed that any of the Enemy were there, and suddenly found ourselves in front of two lines of them, drawn up in the Market Place. Our Escorte of a few Horse thought it high time to retreat; but we thought it rather too late, for the enemy had drawn their Sabres, and surrounded us. One of the Officers had the good fortune to escape unhurt, another, an Engineer Officer under me (W. Richards), escaped with a slight wound after fighting his way thro'. As for myself, I was so entirely surrounded that I never expected to escape; but having the good fortune to preserve my sword, I defended myself pretty well in Front, and kept retreating backwards till I had very few behind me, when I turned and fled for it. A hardy fellow followed me close, but paid the price of his Life for it, the rest of them, thinking I was too much wounded to run far, remained

* The letter from which these extracts are taken was dated, "*Gratton*, off Pondicherry, 31st January, 1761."

in their Places, but kept a continual firing on me till I was out of sight; none of the Balls, however, hit me. Providence must have strengthened my arms whilst I was retreating, for now I found both of them deprived of their strength, and, indeed, no Wonder, for one of them was cut in three places, and the Shoulder Bone belonging to the other divided. One Stroke of a Sabre had cut my Shoulder Bone thro', and laid me open for nearly a foot down the back, wounding several of the ribs, besides a Stab in the same arm, and a large Cut in the hand, which has deprived me of the use of my forefinger."

For surgical help he had to be sent to Dacca, 300 miles off, in an open boat, which he had to direct himself as he lay on his face, whilst the natives applied a cataplasm of onions to his wounds. For a long time he was not expected to live, but eventually was restored to health by the skilful care of Dr. Russell.

He describes another serious adventure in a letter dated October 30th, 1770:—

"I must not forget to tell you that about a month ago a large Leopard jumped at me, and I was fortunate enough to kill him by thrusting my Bayonet down his Throat. Five of my men were wounded by him, four of them very dangerously. You see I am a lucky Fellow at all Times."

Rennell retired from the Engineers on April 9th, 1777, and came home. The Governor in Council allotted him a pension of 500 rupees a month, so that he should not "leave India without some certainty of support in the decline of life." This was changed by the Court of Directors into a pension of £600 a year. He was at the time only thirty-five years of age, and he continued to draw this pension for "the decline of life" for fifty-three years.

Rennell's first publication after his return to England was a "Chart of the Banks and Currents at the Laquellas in South Africa," 1778. In the same year appeared "A Description of the Roads in Bengal and Bahar," and in 1781 he published his Bengal Atlas, compiled from his original surveys. His great work on Indian geography was the "Memoirs of a Map of Hindoostan." This first drew public attention to him, and an unbroken series of important works issuing from time to time for thirty-five years raised his fame as a geographer to a pitch of European celebrity. The "Penny Cyclopædia," in an able notice of him, says:—

"The merits of Major Rennell as a laborious investigator and an acute critic are universally acknowledged. Love of truth, patient and persevering research, and sound judgment, are eminently displayed in all that he did. It is a matter of surprise, with the limited means at his command, that he accomplished so much in his department of comparative Geography. His Geographical System of Herodotus is a monu-

ment worthy of the writer whom he illustrated. A mere list of the works published by him during his life, or after his death by his daughter, would show the wonderful amount of labour and research bestowed upon Geographical questions by him. Till his time England could hardly be said to have possessed any great Geographer."

In an obituary notice the "Times" said :—

". . . . But there was still another quality which more peculiarly marked his writings, and which cannot be too much held up for imitation: the ingenuous candour with which he states the difficulties he could not vanquish, or acknowledges the happy conjectures of others. Those who have studied his Geography of Herodotus, and followed, under his guidance, the Retreat of the Ten Thousand, will have felt how much this quality augments the value of his reasoning."

When upwards of eighty-seven years of age Rennell slipped from his arm-chair and broke his thigh. He hardly left his bed again, and died March 29th, 1830. He was buried in Westminster Abbey, and a tablet to his memory, with a bust, stands in the north-west angle of the nave. An excellent porcelain medallion of him was executed in Paris in 1826, and is now in the Museum at South Kensington.

Lieutenant-Colonel Sir RICHARD FLETCHER, Bart., K.C.H.,

was transferred from the Royal Artillery to the Royal Engineers in 1790, after two years' service in the former Regiment. In 1791 he was sent to the West Indies, where he took part in the capture of Martinique, Guadaloupe and St. Lucia, at the latter of which places he was wounded in the head. He returned to England in 1796, when he was appointed Adjutant to the Royal Military Artificers—a post which he held for upwards of two years. At the end of 1798 he was ordered to the East to be employed in the dominions of the Sultan with the brevet rank of Major. He did good service in this position, and aided in constructing several works of defence in Syria. In December, 1799, he was sent with despatches to Sir Ralph Abercrombie, who was on his road to Egypt with an expeditionary force. Sir Ralph directed him to accompany Major McKerras, R.E., in a reconnoitring trip to Egypt, with a view to ascertaining the most suitable spot for the disembarkation of the army. In this work they were surprised by a French gunboat. McKerras was killed and Fletcher taken prisoner. At the termination of the campaign, after the

capture of Cairo he obtained his release, and was rewarded by the Sultan with a gold medal for his services. He returned to England in 1802, and was employed in the ordinary duties of the Corps until 1807, when he was sent with the expedition under Lord Cathcart to Copenhagen. He took part in the capture of that city, and of the Danish fleet. In 1808 he was ordered to the Peninsula, and arrived just after the battle of Vimiera, when he assumed the command of the Engineers, previously held by Major Landmann. He afterwards became Sir John Moore's Commanding Engineer during his brief advance into Spain and subsequent retreat to Corunna.

On June 21st, 1809, he was promoted to Lieutenant-Colonel in the Corps, having previously held the same rank locally. When Wellington took over the command of the army Fletcher remained as his Commanding Royal Engineer, and was engaged in all his campaigns.

In May, 1811, the Master-General of the Ordnance had represented to the Prince Regent —

"the eminent and important services of Lieut.-Col. Fletcher, and particularly the arduous duties of which he had the superintendence during the late and present campaign in Spain and Portugal, in the performance of which, his zeal and ability had been equally conspicuous."

In consequence of this recommendation he received a pension of 20s. a day. In the spring of 1813 he paid a short visit to England, on leave from the army, and whilst at home was created a baronet and given the K.C.H.

His services in connection with the Lines of Torres Vedras, and the sieges of Badajoz, Ciudad Rodrigo, and San Sebastian, have been detailed in the narrative of those events. He was present at the battles of Talavera, Busaco, Sabagal, Fuentes d'Onor, and Vittoria. He made all the arrangements for the blockade of Pamplona, after which he proceeded to San Sebastian to take over the charge of the Engineer department at the siege then progressing. He was killed at the second and successful assault of the place, being shot through the heart on August 31st, 1813, at the age of 42 years. He was one of four Engineer officers buried on the hill of San Bartolomeo, at the neck connecting the promontory of San Sebastian with the mainland, the three others being Captain Rhodes, Captain Collier, and Lieutenant Machell. A monument has been erected to record the fact. Another monument, designed by E. H. Bailey, R.A., was placed in Westminster Abbey at the cost of his brother-officers.

In a letter from Sir Augustus Fraser, written immediately after Fletcher's death, he says :—

"We cannot get Sir Richard's loss from our minds. Our trenches,

our batteries, all remind us of one of the most amiable men I ever knew, and one of the most solid worth. No loss will be more deeply felt, no place more difficult to be filled up."

Sir John Jones, in his Autobiographical Memoirs, gives the following opinion of Fletcher. No one could have had greater opportunities of forming a correct judgment of his character, as he had served with him throughout all the earlier part of the war, having been his Brigade-Major at most of the sieges where he was Commanding Royal Engineer:—

"Sir R. Fletcher possessed, in an unusual degree, the knowledge and accomplishments of a finished soldier, uniting much general science to long and varied military experience. He was, moreover, hardy, active, and brave to excess; but these valuable qualities were alloyed and almost paralyzed by what, in military language, is called a deficiency of moral courage, or in other words, being too sensitive to the awful responsibility of risking human life, and being too diffident and distrustful of his own judgment, to plan or direct any unusually bold or hazardous enterprise."

Lord Wellington bore ample testimony to his merits in his despatches, where Sir Richard's name frequently appears. After his death the Marquis exerted himself strenuously and successfully to obtain an extremely liberal provision for the children whom Fletcher had left behind him, and who, by his death, had been made total orphans. The baronetcy became extinct on the death of his only son in 1876.

FIELD-MARSHAL SIR JOHN BURGOYNE, BART., G.C.B.,

obtained his commission in the Royal Engineers in 1798. On April 15th, 1800, he embarked to join the expedition under Sir Ralph Abercrombie, destined for service in Egypt. After having been upwards of three months on board ship, and not having got farther than Port Mahon, he was ordered to proceed to Malta, to join the British force under General Pigott, which was aiding the Maltese in their revolt and blockade of the French within the fortress. The garrison, having maintained themselves for two years, were eventually starved out, and surrendered in September. Burgoyne then formed one of the first British occupants of the island. He remained at Malta till 1806, when he sailed for Sicily, and early in the following year was appointed Commanding Royal Engineer, with the troops that proceeded to Egypt under Major-General Frazer. He was present at the capture of Alexandria, when General Frazer in his despatch spoke of "the great zeal and alacrity on the part of Captain Burgoyne, and the

officers of Engineers employed." This was the only advantage gained, and the British were shortly after forced to evacuate the country. Burgoyne had meanwhile been attacked with ophthalmia, and Captain Thackeray having been sent to supersede him—a measure which was afterwards stated to be unintentional—he embarked for Messina on July 26th, 1807.

He was next appointed Commanding Royal Engineer to two abortive expeditions, one intended for the occupation of Lisbon and the other for the defence of Sweden. The latter, under the command of Sir John Moore, after a short stay in that country, was sent to Portugal. Here it arrived soon after the battle of Vimiera and the subsequent convention of Cintra. All the generals senior to Sir John Moore being recalled in connection with that event, he became commander of the army. Captain Burgoyne, however, was now no longer his Commanding Royal Engineer, as Lieutenant-Colonel Fletcher had joined and assumed that post.

Burgoyne was attached to the Light Division, which was in the advance, and embarked with them from Vigo. He was thus spared the worst of the hardships which were encountered by the main body of the army in its retreat to Corunna, but he nevertheless suffered so severely from exposure that he was rendered deaf for nearly five years. He also lost all his horses and baggage.

He did not remain long inactive at home, as we find him landing once more in Lisbon, on April 2nd, 1809, in company with Captain Mulcaster, and Lieutenants Boothby and Hamilton. He was present at the Passage of the Douro, where he was employed in the search for boats to aid in transporting the principal part of the army across the river. On June 12th he received orders, in company with Lieutenant Thompson, R.E., to reconnoitre the Minho and the frontier of the province of Entre-Douro-e-Minho. This work occupied them until July 27th, when they met Marshal Beresford at Almeida, and handed him their report. Burgoyne then set out to rejoin Lord Wellington, and on the 30th came in contact with Soult's army, which was hurrying on to intercept the British in their retreat. But for the friendly guidance of a Spanish peasant, they would inevitably have been captured; but he led them by mountain paths past the French army, and enabled them to rejoin Lord Wellington four days after the battle of Talavera.

Burgoyne remained at head-quarters until the month of May, 1810, during the latter portion of the time being the senior officer of Engineers with Lord Wellington. He was then sent to superintend, first the restoration, and afterwards the demolition, of Fort

Concepcion, in the vicinity of Almeida. This work he carried out under immense difficulty, from want of sufficient labour and *matériel*, and on July 21st, 1810, the fort was blown up. The demolition was considered very complete, and thoroughly realized the expectations formed by Burgoyne. After this he was employed in preparing for the destruction of numerous bridges, to be blown up on the falling back of the British and Portuguese army behind the lines of Torres Vedras. He was present at the battle of Busaco, on September 27th, and wrote an account of it in his journal, which differs in many important particulars from that given by Napier, which has led to so much controversy. On arrival at Torres Vedras, he was appointed regulating officer of the Bucellas district. When Lord Wellington advanced, after Massena's retreat, Burgoyne remained with Head-quarters until he fell sick, and was ordered to Lisbon. Here he stayed until the second siege of Badajoz, when he succeeded in being sent there. He was appointed director of the attack on the left of the Guadiana, against the Castle.

After the raising of this siege, Burgoyne was attached to the Division commanded by General Picton, and was ordered to instruct 200 men of that force in engineering operations, especially "in the art of carrying on the sap." He was also engaged in the preparation of materials for siege operations. He accompanied the 3rd Division to Ciudad Rodrigo, and was made director of the attack conjointly with Captain Ross, in alternate tours of duty of twenty-four hours each. Colonel Fletcher, the Commanding Royal Engineer, in his report on the siege to the Inspector-General of Fortifications, stated: "Captain Burgoyne, who was next in seniority to myself, gave me every assistance, and executed the works under his charge with great zeal and ability." Burgoyne received a Majority for his services on this occasion.

He was also at the third and last siege of Badajoz. He and Major Squire were joint directors of the attack under Lieutenant-Colonel Fletcher, the Commanding Royal Engineer, taking the duty on alternate days. On the night of the assault he led the 3rd Division, under General Picton, to the escalade of the Castle. For this he was promoted to the rank of Lieutenant-Colonel, having been mentioned by Lord Wellington in his despatch announcing the successful termination of the siege.

Burgoyne was next engaged as Commanding Royal Engineer in the reduction of the forts of Salamanca, and was afterwards present at the battle of Salamanca. He then accompanied Lord Wellington to Madrid, where he was employed in the capture of the forts of the Retiro.

His next service was as Commanding Royal Engineer to Lord

Wellington, at the siege of Burgos. The question, as to the causes of the failure of that operation, has been discussed in the portion of this work which treats of the siege, and need not be repeated here. There are, however, two points of a purely personal character, which deserve some notice. The first, was a quarrel that arose between him and Colonel Douglas, who commanded the Portuguese brigade. These men had behaved very badly, and Burgoyne wrote to the Adjutant-General, asking that a certain proportion of British should accompany each relief, as on the previous night "the Portuguese party could not be induced to do anything." This was shown to Colonel Douglas, who replied that he was "astonished that Lieutenant-Colonel Burgoyne could presume to make such remarks on a body of troops who had so often had the honour of receiving the approbation of the Commander of the Forces." Burgoyne referred the whole matter to Lord Wellington, who supported him completely, stating that "it was rather hard that we should be losing frequently the best men in the army because the Portuguese would not do their duty, and then should not be allowed to say so, but, on the contrary, be forced to compliment them." He thereupon directed a letter to be written to Colonel Douglas, to the effect that Colonel Burgoyne's observation was perfectly just, and that he himself knew the Portuguese as well as Colonel Douglas did, and that he had frequently witnessed their neglect of duty, and that he who would maintain the contrary was no friend to the Portuguese.

The other point refers to Burgoyne's personal bearing during the siege. Lieutenant-Colonel Neville, who was an Assistant Engineer, and wounded, writes thus in his Memoirs:—

> "Colonel Burgoyne was the wonder of us all; he seemed to bear a charmed life, for he was almost ever in the trenches, mines, and lodgments."

His next service was the battle of Vittoria, when he was on the Staff of General Picton, commanding the 3rd Division. As this Division bore the brunt of the fight, Burgoyne had many opportunities for showing his mettle. His favourite charger was shot under him, and he rode for the remainder of the day the horse of an artillery officer who was wounded whilst conversing with him. After the battle he advanced with his Division to Pamplona, and saw the commencement of the blockade. From there he was ordered to San Sebastian, the siege of which had commenced. Lieutenant-Colonel Burgoyne served throughout the siege, being director of the attack conjointly with Captain Rhodes in alternate tours of duty of twenty-four hours each. At the storming of

the town he was severely wounded in the neck and jaw, but not incapacitated from duty. On the death of Sir Richard Fletcher, who was killed at the storming, Lieutenant-Colonel Burgoyne became Commanding Engineer, and as such directed the operations for the reduction of the Castle. When the Head-quarters were moved from San Sebastian at the close of the siege he accompanied them in the same capacity, and was present at the battle of the Bidassoa. Lieutenant-Colonel Elphinstone then joined from Lisbon and assumed the command of the Corps at Head-quarters, Lieutenant-Colonel Burgoyne being attached to the left column under Lieutenant-General Sir John Hope, with whom he served in the battles of the Nivelle and the Nive. He was afterwards appointed Commanding Engineer to the force employed in the passage of the Adour, the execution of which most difficult service was superintended by him. He continued to act with the troops engaged in the blockade of Bayonne until the announcement of peace brought that operation to a termination.

Burgoyne's services up to this point had been more extended and of greater importance than those of any other officer of the Corps. He had worked his way steadily upwards, earning every step by sheer weight of merit, and now at the end of the war he was deprived of the position he had fairly won for himself when it seemed within his grasp. Had he retained the post of Commanding Engineer, which fell to his lot when Sir Richard Fletcher was killed, he would have secured the reward allotted to that position when the honours were distributed on the occasion of the peace. This, however, was not to be. The Duke did his best for him by refraining from ordering Colonel Elphinstone to join Head-quarters, giving him the option of remaining at Lisbon. That Elphinstone naturally declined to do, and hastened to the front, dispossessing Burgoyne of his temporary command.

The Duke was very anxious to help an officer whom he had learnt to regard for his talents, zeal, and general efficiency, and he cast about for the best means of doing so. The close of the war having rendered the troops composing his army available for other services, he was directed by the Home Government to despatch a force to aid in the prosecution of the war in America. He seized this opportunity of naming Colonel Burgoyne as Commanding Engineer to the expedition. The threatening state of the Continent led the English Ministers to abandon the idea of sending troops from the south of France to the extent at first proposed, and in its stead a smaller expedition was organized to sail from England under the command of Major-General Sir Edward Pakenham. The Duke's original appointment of Bur-

goyne as Commanding Royal Engineer was, however, maintained, and he sailed for the new service with General Pakenham, on board the frigate *Statira*. He took part with the force in the attack on New Orleans, and at the capture of Fort Bowyer, and at the close of the American war returned to England in the *Bucephalus* frigate, landing at Spithead on May 30th, 1815.

To his extreme disappointment, he found on arrival that he was not to proceed to the Netherlands with the rest of the troops, the Inspector-General of Fortifications being desirous that Lieutenant-Colonel Carmichael Smyth, then Commanding Royal Engineer with the army, should not be superseded in any way by an officer who, although junior to him in the Corps, held higher army rank. Burgoyne appealed to the Duke of Wellington, who sent him the following reply through his military secretary :—

"Brussels, June 10th, 1815.

"My dear Burgoyne,

"The Duke of Wellington has received your letter of the 5th, and has desired me to write to Colonel Chapman on the subject of it, who will probably communicate to you the result of the application. The Duke would be happy to have you with the army, and will regret very much if the rules of the Ordnance prevent Lord Mulgrave from complying with his request.

"Yours very truly,

"Fitzroy Somerset."

Burgoyne had meanwhile been ordered to take over the command of the northern Engineer district at Hull, but on the Duke's application for his services being received, that order was cancelled, and he was directed to proceed to the Netherlands. The battle of Waterloo had meanwhile been fought, and Burgoyne arrived too late to see any further active service. He remained with the army of occupation, performing many important Engineer duties, until November, 1818, when he returned to England.

In the year 1817 the Earl of Mulgrave notified to the Duke of Wellington that being

"most desirous of attending to his Grace's recommendation of meritorious services performed under his command, he will, on the ground of such recommendation, grant the pension of ten shillings per diem to Lt.-Col. Burgoyne for his distinguished services."

The list of services for which this pension was granted, and which accompanied the Duke's application, was as follows :—

Blockade of Malta, 1800.

Storm of the Lines of Alexandria, 1807.
Commanding Engineer, successful.

Siege of Rosetta, 1807.
Commanding Engineer.

Siege of Badajoz, 1811.
Siege of Ciudad Roderigo, 1812.
Siege of Badajoz, 1812.
Siege of Salamanca, Fort St. Vicente, 1812.
Commanding Engineer, successful.
Attack on the Fort of the Retiro, Madrid, 1812.
Commanding Engineer, successful.
Siege of Burgos.
Commanding Engineer.
Siege of San Sebastian.
Commanding Engineer at the latter part, by Sir R. Fletcher's death. Successful.
Blockade of Bayonne, 1814.
Attack on New Orleans, 1815.
Commanding Engineer.
Siege of Fort Bowyer, Gulf of Mexico, 1815.
Commanding Engineer, successful.

General Actions.

Busaco, Salamanca, Vittoria, Nivelle, Nive.

Partial Actions.

Passage of the Douro, Salamonde, Elbodon, Canizal, Aldea de Ponte, Bidassoa, Battles before Bayonne, Passage of Adour, &c., &c.

Certainly the reward he received for such a list was very meagre. Little wonder that Sir John Jones, writing to him shortly after, should say—

"We do not, either of us, seem born to be overloaded with personal honours. You will, I think, in the long run, have justice done to you, and come in for something. Another war will bring officers all to the proper level."

Sir John Jones was correct in this prediction, but he little thought that forty years would first pass away. The next eight years of Burgoyne's life were spent in peaceful duties as Commanding Royal Engineer of the Medway District, during which time he was much consulted upon the proposed transfer of the duties connected with the construction and repair of barracks from the old Barrack Department to the Royal Engineers.

In the year 1826 an expeditionary force was despatched to Portugal, under Lieutenant-General Sir W. Clinton, to prevent the Spaniards from interposing in that country, where a disputed succession to the crown had caused a great division amongst the people. Of this force Burgoyne was appointed Commanding Engineer, and he sailed with Sir W. Clinton on board the

Wellesley, where, as he says in a letter to his wife, they were a famous crowd, twenty-two in the Admiral's cabin, amongst whom he enumerates the Admiral himself (Sir Thomas Hardy), Captain Falcon, R.N., Generals Sir W. Clinton and Sir Henry Boverie, with their respective staffs, Sir Evan McGregor Murray, Sir Charles Brooke Vere, Commissary-General Bisset, Colonels Hare, Burgoyne, Moir, &c. They landed at Lisbon in the first days of January, 1827, and Burgoyne was almost immediately afterwards sent on to Elvas to watch the Spaniards and report to the General at Lisbon. It was feared that the French would assist the Spaniards in an inroad on Portugal, or at all events urge them on to undertake it for themselves. He records on this occasion :—

"The Governor of Elvas is the head of the corps of Engineers, the 'General Munn,' of Portugal, and is said to be a very good man and well disposed."

We get a good description of his travelling military costume in the same letter :—

"My equipment, in addition to my usual dress (blue frock coat, sword, and sash), consists of my cocked hat in an oilskin case, a pair of galoshes over my boots, and dark blue overalls over my trousers, a small oilskin case containing sketching and memorandum books, &c., suspended by a strap over one shoulder, and my spy-glass over the other."

He adds triumphantly in another letter :—

"At the end of my journey I have shaken my feet out of my wooden stirrups (I would not at the time have taken ten guineas for them) dismounted, stripped off my hood, cloak, hat, and overalls, and turned out of my outer casing without a rag that was even damp about me. This I look upon as a great triumph over the elements" (it had poured with rain all day), "and I doubt if there is another man in the army who could do as much."

After two months' stay at Elvas Burgoyne rejoined Head-quarters, then at Coimbra, from whence he was once more despatched on a reconnoitring trip, this time to Portalegre, about thirty miles north of Elvas. He here records :—

"The Spaniards, whom I am sent to watch, are as yet pretty quiet on this frontier. At the beginning of the month, they certainly made movements that indicated hostility, which it was confidently rumoured was decided upon ; in the middle of the month, such intention was said to have been given up, and though since then no new offensive appearances have been perceived, still among the Spanish soldiery there is a persuasion that Portugal will be invaded early in April. I have very little expectation of such an event, but I wish it was so. We should be a little pressed at first, but I feel very confident we should come out of it well."

Nothing in the end came of the Spanish threats, and Burgoyne spent the remainder of the year either with the Head-quarters or

travelling about the country. During the last half of the time his wife joined him, and they remained quietly in Lisbon. She returned to England at the beginning of March, 1828, by which time Colonel Burgoyne had also received orders to go home for the purpose of taking up the Portsmouth command, the expedition having been recalled. The English minister in Portugal detained them for some time, and Burgoyne did not reach home till April 11th. He then took up his command, which he held for three years. During this interval the only incident worth recording is his interview with William IV., which he thus describes in his journal:—

"February 16th, 1831.—Went to Brighton, having been informed that as commanding engineer of the district, it was expected that I should pay my respects to the King there. Dined with Colonel Dowman, R.A., aide-de-camp to the King."

"February 17th.—Had a long interview with his Majesty, who was desirous of consulting me upon the defences of Portsmouth and the protection of Brighton by a sea battery, and the construction of additional barracks. Dined at the palace, party of forty-two present."

"February 18th.—Had another interview with the King, and gave him some memoranda according to his commands, on the points adverted to the preceding day. Dined again at the Pavilion, a party of forty."

In 1831 he was offered and accepted the post of Chairman of a new Board of Public Works to be established in Ireland, to supersede a number of existing Boards which had been found very inefficient. Although the salary attached to this post was less than that which he enjoyed as Commanding Royal Engineer at Portsmouth he willingly threw up his military position and entered into civil life. He, however, evidently contemplated a subsequent return to military duties, as in the letter in which he accepts the post, he adds:—

"The employment being for the government service, and very analogous to the civil duties of the Engineers, there could be nothing unreasonable in my retaining my commission in the corps."

The work that Burgoyne did in Ireland has been described in a previous Chapter, and need not be recapitulated here. It may, however, be mentioned that whilst there he published a pamphlet called "Letters on the State of Ireland." In this he foreshadowed two great grievances, which were many years afterwards dealt with. One was the Church Establishment, and the other the extreme powers exercised by the landlords. The pamphlet did not at the time attract much attention, as it was published anonymously. His friend, Sir Francis Head, after praising the contents, added:—

"I wish you had written a bigger book, and had published it with your

name." . . . "You must not be offended at my saying this, for I remember Murray the publisher once saying to me, 'Sir, an angel from Heaven could not sell a pamphlet.'"

The services which Colonel Burgoyne rendered in his new post were so marked that the Government felt some recompense was due to him beyond the bare salary he was at the time drawing. The following letter from Lord Morpeth, written in September, 1837, shows this clearly:—

"My dear Burgoyne,

"Though it it not a pleasant subject to write about, I have long been anxious that your merits should be recognised by some addition to your inadequate salary, consistent with parliamentary jealousy on points of economy. The Chancellor of the Exchequer acquaints me that he is not enabled at present to make the necessary arrangement for a permanent increase, which, however, I hope is only delayed till he returns to London, but he has sent over a minute that the payment of £500 to you for your extra exertions and services on the Railway and Shannon Commissions should be introduced in the Estimates of the ensuing year. You must be already apprised that every point we wish to establish in life must generally be won by degrees."

The general brevet of 1838, on the Coronation of her Majesty, gave Burgoyne the rank of Major-General, and he was at the same time created a K.C.B., a title he should have received twenty-four years earlier.

In 1839 he was elected an honorary member of the Institution of Civil Engineers, when he was informed that—

"The Council and Institution feel that this tribute of respect is most justly due to your eminent acquaintance with the public works of a sister-country, and to the interest which you take in the pursuit of the civil engineers."

About this time Burgoyne devoted much thought and attention to the reform of the postal service, and the reduction in the rate of postage proposed by Rowland Hill. A memorandum of his, drawn up as early as March, 1838, concludes thus:—

"On the whole there appear to be very strong reasons to conclude that by such complete and effective reduction in the rate of postage, the service will be very readily carried on and the revenue be very far from suffering any diminution; but any attempt at a half-measure, by a partial reduction only, would most certainly fail. Lowering the postage by one-half will not produce double the amount of intercourse. The same considerations very nearly will weigh to impede letter-writing, and the same may be said of any moderate reduction that leaves the cost of letters a subject of consideration; but if the reduction be made to the full extent proposed, it is difficult not to anticipate the most successful result."

Such a prophecy seems in the present day very natural and

self-evident, but that was far from being the case in the year 1838. The scheme proposed seemed at the time, to the majority even of those whose position enabled them carefully to study the subject, to be fraught with the greatest possible danger to the revenue. That it could be carried out without loss was doubted even by many of those who supported the scheme, and the clearness of vision as regarded the effects of the measure, which is displayed in this memorandum, of itself ranks Burgoyne as one of the soundest, as well as most advanced thinkers of the day. That this memorandum was considered of much value by the Government, is clear from the following letter written to Sir John by Mr. Moffatt, M.P.:—

"London, 28 Fenchurch St.,
"Sir, "April 27th, 1839.

"You were good enough to transmit to London in March, 1838, the results of a series of elaborate calculations and practical observations upon the change in the existing system of postage taxation, as proposed by Rowland Hill. That document came into my possession, and unfortunately was mislaid by me until after the parliamentary committee had closed its labours, so that it could not be introduced in evidence. Chancing the other evening to be in the company of the Chancellor of the Exchequer, when the conversation turned upon your merits and abilities as a public officer, the Chancellor of the Exchequer by awarding you a very large modicum of approbation, gave me the opportunity of referring to the aforesaid document, which he was pleased to express an anxiety to see; consequently it was transmitted to him this evening. It affords me much pleasure to render this act of tardy justice to a valuable communication. I am not altogether without hope that Government may originate some measure on the subject in the present session."

"Your faithful servant,
To Colonel Burgoyne. "Geo. Moffatt."

Mr. Moffatt was the member to whom was entrusted the piloting of the bill through the House of Commons.

In 1844 Sir John Burgoyne sent a most important communication to the Master-General of the Ordnance, Sir George Murray, on the question of the best means of holding Ireland, in view of the popular commotions at that time threatened owing to the Repeal agitation. In this paper he pointed out the strategical facilities for holding the country with a comparatively small force which its natural configuration afforded:—

"Ireland may be described, from a military point of view, as consisting of a large tract of plain country, including the counties of Dublin, Kildare, King's, Queen's, part of Tipperary, Longford, Westmeath, Meath, Louth, &c., surrounded by a mountainous contour. Dublin, the capital of the country, with its excellent ports, is in every respect most conveniently placed for a *débouché* from Great Britain into that

central plain. It follows, therefore, that the organized army of the constituted authorities may be at once placed in the concentrated and central position which, by the character of the country, is best suited to such a force, from whence it can be brought to bear at will upon any part of the stronger natural holds that insurgents might occupy on the circumference, and thus, if the attempt was general, break their combinations and master them in succession."

The memorandum from which this extract is taken struck Sir George Murray greatly. He had been Chief of the Staff to the Duke of Wellington during many of his Peninsular campaigns, and had then known Burgoyne. The receipt of this valuable communication apparently reminded him of the important military qualifications which were being lost whilst their possessor was employed upon purely civil duties, and he took an early opportunity of attracting him once more into the career which had for the time been abandoned.

In 1845 Sir Frederick Mulcaster resigned the post of Inspector-General of Fortifications, and Sir George Murray promptly offered it to Burgoyne, by whom it was accepted. This step brought to a close a period of thirteen years of civil service, during which he had succeeded in adding greatly to the estimation in which his previous brilliant military career had caused him to be held. He was now sixty-three years of age, but his constitutional vigour had as yet shown no signs of abatement. He was still fond of field sports, was an excellent shot, and played a very good game of rackets.

He threw himself with ardour into all the questions incidental to his new position. Amongst these may be quoted his memorandum of November, 1845, "On the probable effect of the modern applications of steam power on military and naval operations;" as also one on the subject of the training of infantry to a better and more intelligent use of the musket, a matter which his experience in the Peninsula had led him to regard as most important. At the time it was written this memorandum did not meet with the attention it merited; but on the introduction of the rifle, some years afterwards, it was once more brought forward, and its recommendations adopted by Lord Hardinge.

In the following year Lord John Russell offered Burgoyne a position on the Railway Board, then about to be created; but this he declined, as he preferred the military position he was occupying. The prominent part which he took on the question of improving the National Defences has been referred to in Chapter I., Part III., and need not here be repeated.

In the beginning of 1847 he once more returned to Ireland as a temporary measure, being appointed President of a Special Commission on the Irish famine, "for the adoption of further measures

for the relief of the distress arising from the scarcity in that country." In consenting to this appointment, the Master-General

"begs to express his anxiety that this officer may be allowed to return to his official duties at the Ordnance with as little delay as possible, as his services on very important matters are eminently required."

This was by no means a formal protest, because within three months the Master-General was again urging his recall. In answer to this Lord John Russell wrote as follows:—

"April 30th, 1847.

"My dear Lord Anglesey,

"I am very sorry, but we really cannot spare Sir John Burgoyne at this moment. The loss of poor Bessborough makes Burgoyne's remaining in Ireland doubly necessary. You have excellent officers at your command. Choose the one in whom Burgoyne will have the greatest confidence, and let us keep him for six weeks longer.

"Ever Yours,

"J. Russell.

"The Marquis of Anglesey."

As a matter of fact, Sir John did not return to his duties in London until the end of October. During the next few years he was engaged in his ordinary military duties, in pursuing the important question of the National Defences, and also that of improving the musket of the British soldier. It has been described in the Chapter on our National Defences how the Duke of Wellington had written a private letter to him, in which he expressed himself very strongly on the subject. This letter, a year after it was written, appeared in the columns of the "Morning Chronicle." At first the Duke did not seem displeased at the publication, which strengthened the hands of those who were urging the importance of the question; but unfortunately some of the papers which were averse from facing the necessary outlay began to sneer at the Duke's alarmist views. Matters were made worse by a speech delivered at Manchester by Mr. Cobden, in which he attributed the Duke's letter to senility:—

"His Grace has passed the extremest probable duration of human existence, and we may say, almost without a figure of speech, that he is tottering on the verge of the grave. Is it not a most lamentable spectacle that that hand, which is no longer capable of wielding a sword, should devote its still remaining feeble strength to the penning of a letter—and that letter may be the last public letter which he may address to his fellow-countrymen—which is more calculated than anything in the present day to create evil passions and animosities in the breasts of two great and neighbouring nations?"

The whole speech bristled with remarks of the same offensive tenor, and the Duke bitterly resented them.

He directed his Military Secretary, Lord Fitzroy Somerset, to call upon Sir John Burgoyne for an explanation as to how the letter had become public. To this Burgoyne sent the following reply, which fully explains his share in the transaction :—

"84, Pall Mall, Jan. 21st, 1848.

"My Lord,

"In compliance with the desire of his Grace the Duke of Wellington, that I should explain the circumstances under which his letter to me of the 9th January, 1847, was published in the 'Morning Chronicle,' I beg to inform you that the dangerous state of the country with regard to its gradually declining military establishments had long been a subject to me of reflection and conversation; and having committed some of my ideas to paper, I submitted them to the Master-General of the Ordnance, who communicated them, with his own observations, to several of the Cabinet Ministers. Having had subsequently a long interview with Lord Palmerston, in which the matter was discussed, I thought it a duty to make his Grace acquainted with the opinions contained in the paper, which might or might not be in concurrence with those formed by his superior judgment and authority. The Duke's letter, which has so unhappily come to light, was a commentary on the subject, and containing a dissertation of great general interest, and not connected with any official proceedings, I did not consider it in the light of ordinary official confidential communications, while I entirely acknowledge that I had no right whatever (as I certainly had no wish) to allow it to be published without the sanction of his Grace. I gave a copy of course to the Master-General, and his Lordship communicated it to the Cabinet Ministers. It would also hardly be expected that I should lock up in my desk such a paper, not being deemed by me of that official confidence that requires absolute secresy, and feeling deeply impressed with the consciousness that it was most desirable that the true state of the case should be extensively understood, I showed copies of the Duke's letter in confidence to some persons of distinction, and to several military friends, but always with an express injunction that it should not find its way into print by their means, and this was kept for a twelvemonth. Allusion having been made to the part taken by some ladies, I have to inform you that I have been in the habit of obtaining the assistance of my wife and a daughter to make copies of reports, &c., from my first rough draughts, and occasionally of other documents, and the former lent a copy of this letter to Lady Shelley, through whose means I believe it gained publicity; for in a letter which I received from her she seemed almost to avow it, although when she found I was greatly hurt by the circumstance, she has been inclined to deny it. I have no other clue whatever to understand how the occurrence took place. I deeply regret it, and the more so as it has proved so displeasing to his Grace."

This unfortunate incident cannot be better concluded than by

giving the letter which the Duke wrote to Lady Shelley, a letter strongly characteristic of the writer:—

"Strathfieldsaye, Jany. 23rd, 1848.

"My dear Lady Shelley,

"Notwithstanding the delight with which you and the ladies and gentlemen, your friends, have circulated and at last published my confidential letter of January, 1847, upon the defence of the country, the course which you have taken has been most distressing, painful, and grievous to me, on account of the injury which such publication is calculated to do to the country. You have constituted yourself a sort of authority upon this subject, and it is in that character I address you, these few lines. Sir John Burgoyne has sent me two letters addressed by you to him, one of the 5th, the other of the 6th January, 1848. In the first you express that you have the satisfaction of knowing that Lord Ellesmere had received the Duke's approval of his letter. I request you, as an act of justice to a gentleman, a soldier, and a faithful servant of the crown, to state what you really *know* on this subject. I *know* that I have neither seen, written to, or communicated by message with, Lord Ellesmere since he wrote the letter in question. I am afraid you have inserted in this letter that you had a *knowledge* which you had not, which you could not have, because the fact did not exist and is not true. You will excuse me for being very urgent upon this subject, because it is very important to me as a gentleman and a faithful servant of the crown that I should not be suspected of being concerned in the scandalous, disgraceful, and grievous mischief done to the public interests by the circulation and publication in the newspapers of a confidential letter upon the state of the defences of the country, written by the Commander-in-Chief to the officer at the head of the Engineer department, in answer to a communication from that officer marked confidential; or that I ever had a wish or even an idea of enforcing by clamour a consideration or discussion of the subject in Parliament. My views were always very different. They were, by facts and reasoning to convince the minds of those who desire, and can with regularity originate such discussion, and who must be responsible for the consequences.

"Believe me ever your Ladyship's

"Most obedient humble servant,

"WELLINGTON."

The Duke never quite forgave Sir John Burgoyne his share in the business, innocent though that had been. The old warrior had been grievously stung by the sarcasm hurled at his age, and visited his wrath with great impartiality on all in any way concerned in the business. He, however, was sufficiently magnanimous not to withhold the reward that had been long since earned by Sir John's numerous services. On March 31st, 1852, he wrote to Burgoyne announcing that he was to be created a G.C.B.

On this occasion Sir John took a step for which he has earned

the gratitude of many deserving but not wealthy old officers. He wrote requesting, if it were possible to do so without disrespect, that he might decline the proposed distinction. The grounds on which he acted are thus laid down in a letter he wrote to Lord Fitzroy Somerset :—

"I have made a representation to the Master-General, as my immediate commanding officer, on the subject of the heavy fees that are attached to this promotion. With a family, and very moderate means, after a service of fifty-four years, and at the age of seventy, that is, when approaching the termination probably of my professional and natural life, I feel strongly persuaded that as a matter of moral duty I ought to forego this great honour, attended as it is by an outlay of some hundreds of pounds (equal in amount to *some years* of my widow's future pension), if it can be done without implying the slightest degree of disrespect for so signal a mark of Her Majesty's most gracious favour, or for those who have honoured me by their recommendations, to be guilty of which no consideration on earth should induce me. Your Lordship may conceive what a sacrifice this will be to my reasonable pride and ambition, but I consider that it is one that I should not shrink from under the circumstances."

This strong measure bore fruit, but in the meantime much correspondence arose. In one letter, Colonel Phipps says :—

"With respect to your own case, I can assure you that it has excited the sincerest sympathy upon the part of the Queen and the Prince. That one of the most distinguished officers of the most distinguished service in the British army should have been forced to entertain the painful idea of declining the highest military honour that his sovereign can confer on account of the expense attending it, is very grievous."

The ultimate upshot was that Sir John received a letter which decided the point favourably, not only for himself, but for all future recipients of the honour.

The year 1854 brought about the Russian War. Sir John's share in it has been fully described in the Chapters on the siege of Sebastopol. There are, however, some details of a purely personal character, which may find a place here. In his visit to Paris, at the end of January, he seems to have been much struck with the French Empress. He wrote thus on the subject :—

"I am quite charmed with the Empress; she is manifestly a very fascinating person. She speaks English very prettily, clearly, and correctly, and if at times at a loss for a word it is evidently not from ignorance but want of habit of conversing. She talked to me for some time. She is by no means the commanding looking personage I expected from her pictures, but fair, with a small face and features, very young-looking, rather thin, which they say is recent, and from five feet four to five feet six high."

When he was at Gallipoli his activity struck the French officers

greatly, as they knew he was at the time seventy-three years of age. On one occasion he and his party landed at a place where they had to take a walk through snow, mud, and brushwood with prickly thorn intermixed, to the summit of a high hill about three miles distant. He accomplished the distance there and back gallantly, so much so that Colonel Ardent, the French Engineer, remarked that he was like a "Sous-Lieutenant des Hussards."

When at Constantinople he had an interview with the Sultan, who appears from his description to have been gifted with very little intelligence. He thus describes the interview:—

"About two miles from Pera we pulled up at the gateway of an avenue of a fine pile of buildings, where there was a scrubby guard of the ordinary Turkish soldiers of six men. We walked down the avenue and entered one wing of the buildings, which appeared as if deserted. Seated in a well-furnished reception-room, we were joined by a Secretary of the Sultan, with whom we had pipes and coffee in the usual manner. A kind of upper servant then came in to announce that the Sultan was ready, and we four walked out together across a garden of terraced walks with fountains, without a soul to be seen, and entered the opposite wing, under marble columns, through a large open hall, in which were two or three common-looking servants, up a tolerable staircase, and into a large empty ante-room. At the opposite corner our guide drew a curtain on one side, the Secretary stepped behind, and Count Pisani" (the interpreter) "and I entered, and found, in a room without furniture except the divans round the walls, a single man standing up a little in front of the divan. He was dressed like a common Turkish gentleman, quite plain; a short man, apparently about thirty-two years of age, his hands in his coat pockets, and with the toes of one leg turned in so much, and one knee so bent, that he looked like a cripple, which I understand he is not at all. I paused for a moment, but it struck me at length that he must be the Sultan, and I made a bow, then advanced, and, when near him, made another. Count Pisani being by my side, I looked at the stranger, and he stared at me without saying a word; so, after a pause of some seconds, I thought it necessary to begin, and said, through the interpreter, that I was proud of having the honour of paying my respects to his Majesty, to which he muttered, in a deep base voice, that he was glad to see me. Another pause, and, as he did not seem inclined to say anything, I began again that I was on a mission from my Government, relative to the war, and had observed much that I hoped was satisfactory, to which he wished me a long life. Another pause, and then he made a slight inclination of the head, which I thought a sign that I might retire, which I did accordingly, rejoined the Secretary in the ante-room, and we repaced our way through the deserted halls and garden. Surely never was a monarch before attended with so little state!"

Shortly after Sir John's return to England, Sir Hew Ross was appointed Lieutenant-General of the Ordnance, to take over the

duties of Master-General during Lord Raglan's absence at the seat of war. This was undoubtedly an act of great injustice to Sir John, who at the time was his senior in rank, and he, in consequence, tendered his resignation as Inspector-General of Fortifications, suggesting that it would be better for the Corps that their head should, under the circumstances, be an officer junior in rank to Sir Hew Ross. To this the Duke of Newcastle replied in a most friendly and courteous letter, in which he pointed out that the only reason for the apparent slight was the desire of the Government to keep him free to join Lord Raglan in the East should circumstances call for such a step. Burgoyne acquiesced in the views of the Government and withdrew his resignation, but the terms in which he did so showed how deeply the old soldier was pained :—

"Determined as I ever have been, and still continue to be, to resign every private feeling or interest to the requirements of the Government, I yield to the pressure put upon me on this occasion ; but in doing so I feel that I am making the greatest of all sacrifices, involving a lowering of pride and position in the eyes of my friends, brother-officers, and the army in general."

Lord Raglan on this occasion wrote him as follows :—

"I am very glad to find that the Duke of Newcastle and Lord Hardinge have induced you to reconsider the view you first took of the arrangement made by the Government for the discharge of the duties of Lieut.-General in the absence of the Master-General. I am very glad for the sake of the public service that you have determined to remain, and I should hope that you would soon lose all idea that it is in any way lowering to you. Such a notion never entered my head, and I should indeed be wretched if you should think that I, who have known you so long, and have entertained so great a regard for you, both as a friend and an officer of the highest distinction, service, and ability for such a length of time, should have been a party to any course of proceeding calculated to affect your reputation or the estimation in which you are universally held."

Sir John's second visit to the East, to join Lord Raglan's army, was prefaced by a letter from the Duke of Newcastle, dated August 11th, 1854, in which he asked Burgoyne to call on him at once. In this interview the Duke put the question plainly to him whether he would go, and if so, when. The answer was in the affirmative, and the time named was the following afternoon. Wrottesley states that the Duke had never seen Sir John, and that before he made the offer he effected a reconnaissance to see whether so old a man possessed the physical and mental activity necessary for taking a part in the operations of the field. He accordingly called at the Ordnance Office and had a long inter-

view with him on August 7th. The result of this must have been satisfactory, since he made the proposal for him to join the army only four days later.

He arrived at Varna before the end of the month. He appears to have had many doubts as to the wisdom of the expedition to the Crimea, and writing from Varna, on August 24th, says :—

"It is not to be expected that I, coming out so late and under the repute rather of a professional Engineer than otherwise, should have any opportunity of expressing any opinion upon the great project, nor have I, and I am glad that I have not, for I must confess that I do not understand on what sound principle it is undertaken. This is not the time for discouraging anybody, and consequently I do not hold to a soul, opinions that I may give you at a distance confidentially. It appears to me to be the most desperate enterprise ever attempted."

When he embarked for the Crimea he took Captain Burke of the 88th (brother to Lieutenant Burke, R.E., who had recently been killed at Rustchuk) as an extra Aide-de-Camp in conjunction with Lieutenant Stopford, R.E. He landed on September 16th, and at once began the roughing of a campaigning life. Conolly, in his history, says :—

"Sir John Burgoyne passed a night in bivouac with the company (the 3rd), and all that could be got for him to rest upon was an old door. Upon that the aged warrior stretched himself, with a composure and satisfaction that showed how well he had braced himself to the vicissitudes and hardships of war."

Burgoyne himself says :—

"I passed a most comfortable night, with Stopford in the same bell tent. That we are not well off for *luxuries*, you may imagine when I tell you of two excellent reasons given by Maguire for not giving me some hot water for shaving. *I can't give you no hot water, Sir John, because there is no fire nor no water.*"

He thus described his experiences at the battle of the Alma :—

"Stopford is a very fine fellow, but too anxious to take care of *me*, always on the look out to prevent my remaining at any point that happened to be a peculiar focus of fire. My grey horse (lent me by General Tylden on account of extreme quietness, almost unpleasantly sleepy and lazy) all of a sudden, just as we passed a place on which was a very smart fire, commenced prancing and pulling, and became so fidgety that after a time I changed with Stopford. It was after dark when we got to camp, having been twelve hours on our horses, and this morning we find a musket-shot had grazed the skin of one of his hind legs, and it is somewhat swelled, but I hope will not lame him."

After arriving at Balaklava he thus wrote about himself :—

"I never felt in better health, and have sustained but little hardships, but am fatigued and *muscularly* feeble by the lengthened work on horse-

back" (he had been for twelve hours at a stretch on horseback at the Alma, and for a still longer period during the flank march). . . . "I think you never in your life saw so scrubby a looking gentleman as I am, a red worsted shirt with white buttons, red uniform waistcoat, a broad scarlet worsted band wrapped by three or four turns round the waist (a recipe against cholera), very much worn undress uniform coat and trowsers, a white shirt-collar, washed, I believe, without soap, and not ironed, a black silk neckerchief which is rapidly assuming a brown tint, a cocked hat, old and tattered, and without a feather. I look for all the world like a shabby Commissary's clerk of the lowest class."

Burgoyne was for some time very naturally annoyed at the absence of any recognized position in connection with the army. He had been hurried out at the last moment by the express wish of the Government, and had been promised that his appointment should be at once prepared and forwarded to Head-quarters. Week after week, however, passed by without this pledge having been fulfilled, and many difficulties arose in consequence. Lord Raglan behaved with the utmost consideration and regard, but still it was impossible for Burgoyne to avoid a feeling of irritation at the apparently wanton neglect with which the Home Government was treating him after having made such free use of his services. His letters show how strong this feeling was, though he was a man of such controlled temper that he never wrote bitterly. At length, however, the much looked-for appointment was announced in the following letter from Lord Hardinge, dated Horse Guards, October 19th, 1854:—

"You have been placed on the Staff of the army in the East as a Lieut.-General, and in case of the absence of the Commander of the Forces, would be in command of the army. You will, of course, name your own staff, &c. I congratulate you, the army and the country, that the step was taken of sending you out. You have your difficulties to overcome; the labour of moving the guns, ammunition, and stores must be very tedious and time precious, whilst disease may increase and diminish our means, and it would be serious, if to gain the object, great as it is, the force is so greatly crippled as to be unable to resist a Russian force in the field, which is able to move. This, of course, we are unable to do *now*, because we have no baggage animals, and people will not understand that this is a primary necessity in the composition of every army. Ships being the basis of our operations on which everything has from the first moment depended, the masterly change of moving the army to the southern side, with the gain of a safe harbour, and an easier attack on the ships and the place, has given you immense advantages. I don't think the expedition could have succeeded unless this mode of converting insecurity into comparative security had been made. What do your French allies think of it?"

Another source of annoyance which had arisen, was that in the

original vote of thanks to the army for the battle of the Alma Sir John Burgoyne's name did not appear. This was evidently only a stupid oversight, but it was none the less galling. The error was promptly rectified as soon as discovered, and on November 17th he writes :—

"The thanks to the army for the battle of the Alma has been revised and reprinted in order to introduce my name, and with a copy of it Lord Raglan sends me a pretty note, which, being written to me from the adjoining room, shows that he means there should be no mistake about it."

It may be mentioned with reference to this that Lord Raglan occupied a farm-house as his head-quarters, and had insisted upon allotting a room out of his scanty accommodation to shelter Burgoyne. All the other Generals were under canvas. He gives a very good account of this room and of his mode of life in a letter to his family :—

"To give you an idea of my personal situation here, imagine me in one corner of a whitewashed barn-like looking room, twice as big as your front drawing-room, with three rattling windows on one side and two at the end, one opening of about a foot square in the plain face of the middle of one wall which closes with an iron door, and another immediately below it of half the size, from which are deep openings to the middle of the thick wall, and form a kind of stove. The top of what *was* a card table (the green cloth which had been glued on torn off) loose upon its stand, so that when a stranger (for *I* know better by experience) puts his arm upon it, it tilts over with every thing upon it, two camp chairs, a stretcher with an air mattress and blankets, and a large packing-case to hold fuel—*when I can get it*—a bayonet for a poker, and a bit of bent iron from Mr. Hart's packing-case for a shovel. Without a book of any description, or resource of any kind but my business and my own thoughts, here I sit in this wet wintry weather, wrapped up in my cloak, except when I can by luck get a little fuel to light a fire, candles scarce, and for fear of being totally without them, sitting in the dark buried in my own reflections."

This seems a sad picture of the hardships to which the old hero in his seventy-fourth year was being exposed, but in the next lines we see the wonderful unselfishness and thought for others which were such loveable traits in his character, and made all who were thrown much with him so devoted to him. The letter proceeds :—

"Now look at another picture. Cold, heavy rains, to which the whole of the army, with the exception of Lord Raglan's headquarters, are exposed in tents in a country which is ankle-deep in mud and clay from the very door of the tents, every thing more wet than damp, all chilly and comfortless. From this scene I retire to a large clean room, thoroughly weather-tight, where I manage by hook or by crook to get

frequently a good fire by husbanding my resources, particularly in the evenings or other times when peculiarly wanted. Though candles are scarce, my friends sometimes get me a few pounds, which sets me up in the world; my bed is warm, with plenty of blankets, and there I lie and hear the pitiless storm, unscathed myself, but with much feeling of unhappiness for the discomfort it brings on our companions in the neighbourhood."

The question of the recall of Sir John Burgoyne from the Crimea, and the substitution of Major-General H. D. Jones as confidential adviser to Lord Raglan, is one which requires some explanation. The news which gradually reached home of the sufferings of the army in the East, following as it did on the disappointment so generally felt at the continued resistance of the fortress, made the public very irate. It was but natural that all these misfortunes should be visited upon the Government, and a cry arose of mismanagement requiring investigation. Just at the time when the Ministry was most unpopular, a complaint reached Paris from General Canrobert and the French Engineer Bizot that Burgoyne was the impediment to action, he having strenuously urged that an advance should be made on the Malakoff before any assault was delivered on the Redan. Smarting under the attacks made on themselves, the Government seized upon this opportunity to recall Sir John. Fortunately the Emperor Napoleon decided upon sending out General Niel, a French Engineer of high reputation, to report on the matters in dispute between Burgoyne and Bizot. That officer strongly supported Burgoyne's views, and succeeded in having them carried into effect. It was still, however, thought best to persevere in the change, and no doubt rightly so, for Sir John had already suffered far more hardships than a man of his years could well bear, and it was high time for him to be relieved. The recall was now put upon a very different footing from what was originally intended, and so far from his returning to England under a cloud, he received, on the contrary, every consideration. Lord Panmure, the Secretary at War, distinctly stated in the House of Lords that he

"wished to make it clear that the recall of this officer is not from any fault found with him by the Government, but arises from the fact that a younger officer has been sent out to assume the duties of commander of the Royal Engineers and to assist Lord Raglan with scientific advice, and that it has therefore been thought right to recall Sir John Burgoyne, a man now far advanced in years, from the sufferings of a Crimean winter, to resume his duties as Inspector-General of Fortifications."

The Marquis of Lansdoune followed this by stating that he

"had occasion to know that Sir John had, at the earnest request of the

noble Lord, the late head of the War Department, unhesitatingly sacrificed his own comfort and every other consideration for the discharge of the important but temporary duties which were confided to him. In doing so Sir John Burgoyne had, however, only acted in accordance with the whole tenour of his life, which had been a continual sacrifice of his private convenience to the public service. He had done so in a variety of services, and on great exigencies in the history of this country he had shown on several occasions the greatest administrative capacity, and he had conducted himself on all occasions with the highest honour to himself, and the greatest advantage to the country."

Sir John received the intelligence of his recall with keen disappointment. He had just succeeded in carrying his point as to the attack on the Malakoff. Matters were clearly improving at the camp, and he had every hope that the seed he had so painfully sown during the long and terrible winter was about to develop into a satisfactory harvest. The old soldier clung to his post, and on March 3rd, after having written a letter in a very desponding frame of mind, he adds a joyful postscript—

"I AM NOT OFF YET. Lord Raglan told me last night he should like to detain me for a little time if I had no objection. I told him I had most decidedly none. So here I shall remain at a kind of single anchor. At least it is complimentary to me on the part of my Lord."

This was written after the arrival of General Jones.

The old warrior could not, however, help feeling a little sore at his advancing years having been given as a reason for his recall, and in a tone of mild bitterness (his bitterness was always extremely mild) he wrote—

"From the tenderness Lord Panmure, &c., feel for *my great age*, I suppose you will expect to see me return with a tremulous, weak voice, without teeth, and on crutches."

Sir John ultimately left the camp on March 20th, and after dining with Sir Edmund Lyons on board the *Royal Albert*, sailed the same evening in the *Banshee*. His journey home was somewhat tedious and prolonged. After calling at the Piræus and visiting Vienna he arrived in England in the middle of April. On reaching London he found a summons to Windsor to attend the Councils of War that were being held there during the presence of the Emperor of the French in this country. In these his advice was eagerly sought, and carried much weight. He resumed his duties as Inspector-General of Fortifications, which the prosecution of the war rendered more than usually onerous. In August he paid a visit to the Queen at Osborne. On this occasion he writes:—

"I had to take Lady Desart in to dinner and to sit by the Queen, who was very gracious and seemed to know everything, even that I had brought down a plan of the attacks of Sebastopol, which we had just received from General Jones—asked me if my son-in-law" (Capt. the Hon. G. Wrottesley) "had not returned from the Crimea—whether I had been to Paris as a juror, &c., in short entered into the sort of conversation that is usual with well-bred people not so high in station." . . . . .
"The Queen remarked to me that I had not my Crimean medal on. I told her, what was the fact, that it was my misfortune not my fault, but that I laboured without effect to fix it on my coat until I was afraid of being too late."

The reference in this letter to his duties as a juror in the French Exhibition leads to the statement that he was compelled to pay several visits to Paris on that account, and was treated with great consideration by the Emperor. On one of these visits he attended a reception at Versailles, which he says was a grander spectacle than he had ever before seen—

"It beat the Hôtel de Ville to pieces. The supper in particular in the Salle du Théâtre was the most brilliant thing possible. I was in a doorway at one time, close to the passing procession of Royalty, but not observed by any but the Prince of Wales, who, after passing, turned round with a little smile of recognition."

On September 15th Sir Harry Jones wrote him a letter announcing the capture of Sebastopol. The first words of that letter must have been very gratifying to him. They were as follows: "Sebastopol was taken by the point you always indicated—The Malakoff."

On January 30th, 1856, Sir John received the notification that he was to be made a baronet. Lord Panmure, in his letter announcing the fact, says that it was bestowed "in consideration of your long and faithful services to the Crown, and which were latterly performed with such important results in the Crimea." This dignity was gained forty years after three of his brother officers, Smith, Elphinstone, and Jones, had obtained a similar mark of Royal favour; and yet who can study the history of the Peninsular War without feeling that at that time his claims, based on actual service, far outweighed any one of the trio?

Sir John's modesty, even at this late period, is strongly marked by a letter which he wrote to Sir John Montague Burgoyne, who was the head of his family, in which, after recapitulating what Lord Panmure had said, he adds:—

"I can assure you that there is no desire on my part to encroach upon your superior station as the head of the old illustrious family of the Burgoynes."

He seems to have been much pleased at the manner in which the other Sir John received the news, and writes :—

"I met him yesterday at the club, and when I mentioned the matter of *the Arms* he shouted at the idea of an objection or difficulty, told me to be particular about *the Talbot*, that there were but two families that had that particular Talbot—one Palmers, and the other Burgoynes. . . . . He is one certainly of most kindly feelings, and talked of the *honor* and pride they all felt in me."

In 1858 occurred the attempt on the French Emperor's life by Orsini and other conspirators, who had hatched their plot in London. The indignation throughout France at what they considered the shelter given to assassins by England, culminating in the address of the French officers to the Emperor desiring to be led against this country, created a fresh war panic. A secret committee was formed to consider the best means of preparing against a rupture with France, under the presidency of the Duke of Cambridge, and of this body Sir John Burgoyne was one of the most important members. Among the measures he brought forward was one to encourage the formation of Volunteer Corps throughout the country, to support the regular military forces in the event of an invasion. It is well known with what magnificent success this scheme has met, but it is not so well known that the first originator of it was Burgoyne. When Thackeray started the "Cornhill Magazine" at the commencement of 1860, he secured an article from Sir John's pen on his favourite subject of our Volunteer organization, which was by that time making good progress. This article helped greatly in establishing the phenomenal success of the periodical. In a letter to Burgoyne, in which he warmly praised the article, Thackeray adds :—

"I think I needn't tell you the magazine has been an immense success; such a sale has never been known in England before. The editor and publisher are both reasonably elated, and the latter has determined to show his sense of gratitude by inviting the contributors to dinner *more Anglicorum*. You, who have been such an efficient contributor, I hope will go through with your duty and give us the honour of your company."

In the latter part of 1858, Sir John Burgoyne was sent on a complimentary mission to present to the French Emperor the funeral car which had been used at the burial of the first Napoleon at St. Helena, and which had since been preserved at Woolwich. The Emperor had privately expressed a great desire to possess this relic. The English Government acquiescing in his wish, sent Burgoyne with it to Paris. In the address which he made

to Prince Napoleon on presenting the car, Burgoyne said that the Queen had directed him to "place at the disposition of the Emperor the funeral car which conveyed to his first tomb the remains of the illustrious founder of the Napoleon dynasty." Lord Cowley, who was there as the British Ambassador, expressed himself in warm admiration of the diplomatic ingenuity with which Sir John had avoided all mention of St. Helena, at that time a name extremely abhorrent to the French, and had also brought in an allusion to the Napoleon *dynasty*, a word peculiarly gratifying to the Emperor. Whilst in France Burgoyne was invited for a couple of days to Compiègne, and was present at a magnificent hunt in the forest. He records on this occasion :—

"I had a long conversation with the Emperor (this was after dinner on the first day), as we walked together up and down a long drawing-room, on Sebastopol, General Niel, our early projects for defensive warfare only when on my way out to Turkey the first time ; rifled cannon, &c. One of the Emperor's A.D.C.'s talking of General Niel's book, said that he found from it that from a very early time I had told them that Sebastopol must be taken by the Malakoff." . . . . "I went" (to the *chasse*) "in a *char-a-bancs* with Count Walewski ; we talked about the Crimea, and I mentioned that I was the oldest man of all the armies there engaged. He said, '*Ah ! oui, vous en étiez le Nestor*,' which, as Nestor was notoriously the wisest of the chiefs, I took as a pretty compliment."

The next few years of Sir John's service as Inspector-General of Fortifications were much taken up by the scheme for the National Defences, which he was at length permitted to see carried out. During this time he was also consulted by the leading Engineers of foreign countries. His correspondence with the Belgian Engineer Brialmont ; the American, Totten ; and the Russian, Todleben, proved that in spite of his great age he maintained as clear an intellect, and as keen a grasp of the vital points of a question, as were so peculiarly his gift in his best days. He also showed, what is so rare in an old man, a thorough appreciation of the changes which the developments of modern science were bringing about in the art of war.

On March 13th, 1865, Lord Palmerston announced to him his nomination to the appointment of Constable of the Tower. His biographer, Wrottesley, states that this, although without emolument, was an honour which seemed to give him greater pleasure than any he had previously received.

Early in 1868 Sir John retired from his post as Inspector-General of Fortifications, receiving the rank of Field-Marshal, together with an allowance of £1,500 a year. On this occasion the London papers vied with each other in complimentary articles.

Perhaps the most gratifying of them all was that in the "Examiner," in which occurs the following passage :—

"Sir John Burgoyne now retires, after an unusually long life spent in the service of his country, during which it may be confidently asserted that he never by his own fault lost a friend or made an enemy. The Grand Cross of the Bath, a baronetcy, and a Field-Marshal's baton are the great prizes which his merit has won. But these are only the outward symbols of that deep and hearty appreciation which his countrymen entertain of his faithful and brilliant services. He retires full of years, but still hale in body, and with an unclouded intellect, carrying with him into private life all

"'That should accompany old age—
As honour, love, obedience, troops of friends.'"

Laudatory as these articles were, Burgoyne was shortly after able to test their sincerity, for it fell to his lot to do what has been given to but few, and that was to read his own obituary notice in the "Times." It is well known that the biographical notices of all distinguished men are kept prepared for prompt use in the pigeon holes of that journal, but of course they are sacredly kept from view. It so happened that Sir John *Montague* Burgoyne died. The leading paper for once made a mistake, and the next morning there appeared a long and able obituary article on Sir John *Fox* Burgoyne, which the aged Field-Marshal was able keenly to appreciate.

His health and strength at the time of his retirement were so unimpaired that he still bid fair to weather the storms of time for an indefinite period. He was absolutely free from all ailments, except deafness, and his pulse was as strong as it had been forty years before. He was, however, doomed to suffer a crushing blow, which in a few short months did more to destroy his magnificent constitution than all the hardships he had for so many years undergone. His only son, Captain Hugh Burgoyne, V.C., R.N., had been selected to command H.M.S. *Captain* at the special request of her designer, and was lost when that unfortunate ship capsized in September, 1870. Sir John never really rallied from this shock, although he made feeble efforts to do so. It was touching to see how the venerable hero bowed to the storm which was so shortly to overcome him. At length, on October 7th, 1871, in less than a year from the time he learnt the fatal news, he sank to his rest at the age of 89 years.

He was buried in St. Peter's Church, in the Tower, in the presence of all that was great and notable in the way of military, naval, or political distinction. His sorrowing brothers in arms in the Corps erected in London a statue in his honour,

which now stands near the Duke of York's column. On its base it bears, as an inscription, the following felicitous quotation from Shakespeare's play of Coriolanus:—

> "How youngly he began to serve his country:
> How long continued!"

General Sir CHARLES WILLIAM PASLEY, K.C.B.,

obtained his commission in 1797. He was first gazetted to the Royal Artillery, but on April 1st, 1798, was transferred to the Royal Engineers.

Between 1799 and 1807 he served in Minorca, Malta, Naples, and Sicily, and during that time was employed on various important duties and confidential missions. His war services during this period embraced the defence of Gaeta and the battle of Maida. In 1807 he was present at the siege of Copenhagen, after which he joined General Leith at Oviedo, and was ere long made extra Aide-de-Camp to Sir David Baird on account of his proficiency in Spanish. Sir John Moore took him on his staff in the same capacity, and he remained with him until his death at the battle of Corunna.

Captain Pasley's next service was with the Walcheren expedition including the capture of Flushing. In this operation he was severely wounded, whilst leading the stormers of a column under Colonel Pack against the French outposts on the eastern dyke. He first received a bayonet-thrust in the thigh, but maintaining his post in spite of the wound, was afterwards shot through the body, the bullet injuring the spine during its progress. For a long time he was not expected to survive the shock, but the excellence of his constitution and complete rest at home enabled him to recover from the shock.

These wounds completely incapacitated him from any further active service, and it tells much for the character of the man that he did not permit the misfortune to damp his ardour or blast his career. Debarred from the prospect of earning further distinction in war, he devoted his energies to the good of the service and the improvement of his Corps.

In November, 1810, he published his "Essay on the Military Policy and Institutions of the British Empire," a work intended to advocate greater energy and perseverance in prosecuting the war against France. This essay ran through four editions within two years, and a very favourable notice from the pen of

Mr. Canning appeared in the "Quarterly Review," in which that writer stated that it was one of the most important political works that had ever fallen under his notice.

Whilst in command of the Company of Military Artificers, at Plymouth, in 1811, Pasley began that system of instruction in field-works which was destined to prove of so much value to the Corps. The representations of the Duke of Wellington as to the defective training of the Engineer service as shown in the earlier sieges of the Peninsular War, led to the formation of an establishment for field instruction at Chatham, and Pasley was appointed the first Director by Lord Mulgrave, in June, 1812, with the brevet rank of Major; and in 1814 he became a Lieutenant-Colonel in the Corps.

Whilst this appointment was pending, Pasley wrote the following very characteristic letter to Burgoyne:—

London, March 2, 1812.

"Dear Burgoyne,

I congratulate you upon the honour which you *will have* of being the officer who trained the first sappers in the British service that ever acted against an enemy, I believe my men at Plymouth were prior, as far as the mere practice goes. I have now sent out a detachment to Portugal, who are all to be attached to your company. Serjeant Davis is at the head of it, a man whom I recommend to you most particularly in consequence of his superior abilities and good conduct. Corporal Hooker is also a fine fellow, but the former was the cleverest man at Plymouth. He made my models of pontoons, and taught plan drawing, &c., to the other men. There are also two privates, Hugh Best and Hugh Watt, whom I recommend to you as deserving of promotion. These two men also understand the principles of plan drawing, and have marked out batteries, &c. . . . . They have sent for me up to town and mean, I believe, to employ me on a duty for which I formerly volunteered, that is, to digest and put in practice a system for training all the young officers and men to their field duties; and I believe it is at last determined that the men are to be called 'Sappers and Miners.' What is very absurd, old Morse" (the I.G.F.) "is to be at the head of a committee for considering this point—he who threw cold water on it from the first in all its stages. After Jones's promotion" (a majority, for the siege of Ciudad Rodrigo), "I sent a memorial to Lord Mulgrave, stating my services, and requesting him to recommend me to the Commander-in-Chief. Mann supported it, I believe, to the best of his power. To my great surprise, I received an answer to say that Captain Pasley's services were certainly *very great and meritorious*, but they were performed in a *different administration*, consequently Lord Mulgrave did not think it incumbent upon him to *notice them*. He also stated, fortunately for me, that as for training the young officers, sappers, &c., he considered that a duty which could not give an officer any possible claim to notice, as it

was not performed in the face of an enemy. Hence you see that Lord Mulgrave erases all my past services at once, and, as a great favour, it appears that he intended to deprive me of all opportunity of performing new ones by appointing me drill-master; for I collected from his conversation, when I had an interview with him, that he was stupid enough to confound the plan I had in view with the drudgery of a brigade-major in an office or of an adjutant on parade. I have announced both to him and to General Mann my decided aversion to be employed in a situation which, it appears, is considered so worthless a duty, and have retracted my former offer. If they do not promote me (but of this, I assure you, I have no hope), I have determined to publish the system of instruction which I adopted at Plymouth, and which was brought to so much perfection that Serjt. Davis and two of the privates were able to teach practical geometry, plan drawing, and the principle of the attack of places to the rest of the men. By this means I shall, at least, secure the credit of my labours which have been so thanklessly received."

Colonel Pasley organized, during his residence at Chatham, improved systems of telegraphy, sapping, mining, pontooning, and the explosion of gunpowder both on land and under water. In connection with the latter subject he undertook the removal of the brig *William*, and the schooner *Glenmorgan*, from the bed of the Thames, near Gravesend, in 1838. For this service, which he performed most successfully, he received the thanks of the Corporation of London, and the freedom of the City in a gold box. He next undertook the more formidable task of clearing away the wreck of the *Royal George* from the anchorage at Spithead, and that of the *Edgar* from St. Helen's. Six successive summers, from 1839 to 1844, were devoted by him to the work, the value of the materials recovered during the operations more than balancing the costs incurred.

Colonel Pasley remained at the head of the Chatham Establishment till the end of the year 1841, when he was appointed to the office of Inspector-General of Railways, which he held for five years. He received the honorary degree of D.C.L., at Oxford, in 1841, and in 1846 he was made a K.C.B. for his long and valuable public services. He died in 1861 at the age of 80 years.

To the end of his days he seemed to court risks of every kind, and frequently had to be remonstrated with on the reckless manner in which he exposed his life. It is told of him that on one occasion he was in a diving bell with a brother-officer, at the bottom of the Medway, testing a code of signals he had arranged. His companion noticed, to his horror, that the diving bell was fast sinking in the mud, and drew Pasley's attention to the fact. He, however, declined to make the signal for being raised to the surface till he had completed his work, by which time the bell had

become so deeply imbedded that his companion had given up all hope of escape. He was always accustomed to volunteer for any service where danger was to be braved, or credit to be gained, and he constantly impressed on the young officers who were under his charge, that the only way to attain success in their profession was to be ever foremost in hazarding life and limb in the performance of their duty.

Major-General Sir JOHN THOMAS JONES, Bart., K.C.B.,

obtained his commission as Second Lieutenant in 1798, at the early age of fifteen. He was at once sent to Gibraltar, where he was quartered for four years. During this time he was engaged in the ordinary duties of the Corps, chief of which was the superintendence of the excavation of the galleries which were still in process of formation. He was Adjutant to the Royal Military Artificers. In his Autobiographical Memoir Sir J. Jones relates an amusing incident which occurred to him whilst at Gibraltar. He had become very much liked by the Governor, General O'Hara, who used to call him his own boy, and whenever distinguished strangers visited the Rock and desired to be shown round the works, young Jones was told off to the duty. On one occasion he acted as cicerone to the Duc d'Orleans (afterwards King Louis Philippe), the Duc de Chartres, and the Prince de Beaujolais. They started on their tour at daybreak, and the Governor desired Jones to bring them back in time for breakfast at 9 a.m. The Princes were so curious in their inspection, and looked into everything so minutely, that much time was expended. The result was that at a quarter to nine they were still at the summit of the rock. Jones considered his orders imperative, and at once moved his party homewards at a rapid pace. The rest of the story may be told in the words of his memoir:—*

"Accustomed to the steep and rough roads, he urged his horse forward at good speed, the other horses naturally wishing to follow, but being held back by their riders, became impatient and restive, and the Princes uneasy and annoyed, more particularly when they found every remonstrance, and every assurance that the Governor would gladly wait breakfast for them, doubted by their cicerone. Thus unceremoniously treated, they had nothing left but to gallop over the rocky roads as best

* This memoir, although autobiographical, is written in the third person throughout.

they could, and the sun shining out powerfully, they reached the convent quite done up, or in General O'Hara's words, 'perspiring at every pore, with their tongues parched, and hanging out of their mouths, and demanding wine and water with all the energy of which they were capable.' After they had been refreshed General O'Hara inquired if their conductor had done his duty, to which the Duc d'Orleans, with much good-humour, replied—'Ma foi, oui; Monsieur is truly a far better soldier than courtier,' and then, very good-humouredly, related his having to risk his neck and the chance of a fever for the sake of military punctuality to the breakfast hour."

Lieutenant Jones returned to England in 1803, where he remained for two years. In 1805, having just been made a Second Captain, he embarked with five other Engineer officers on what was intended at the time to be a secret expedition, with a force of 5,000 men.

He records, as a proof of the dangerous duties devolving on Engineer officers in active service, that, of the six officers thus starting for the war, two were killed (Lefebure at Matagorda, and Nicholas at Badajoz), two lost their legs (Boothby at Talavera, and Lewis at St. Sebastian), and he himself had his ankle smashed, at Burgos, rendering him lame for life. Nothing came of this undertaking, and the troops were landed at Malta, where Captain Jones did duty till the autumn. He then formed part of the expedition to the kingdom of Naples and Sicily. He was present at the battle of Maida and the subsequent operations, including the capture of Scylla, the siege of which was, in its earliest stages, conducted by him. In the autumn of 1806 he visited Algiers in the *Hydra* frigate, and afterwards returned to England. Here he was selected for the appointment of Adjutant and Quartermaster of the Royal Military Artificers, which corps had recently been reorganized and increased to twelve companies. This appointment involved "the difficult task of arranging and directing the details of the new organization both at home and abroad, and of carrying into effect a general system of drill and discipline."* Jones did his work so well that it was with the utmost difficulty, and not till after several refusals, that he was permitted, in 1808, to resign it in order to proceed on active service.

On the outbreak of the popular movement in Spain in the summer of that year, General Leith was appointed military and diplomatic agent to the various revolted Juntas, and two Engineer officers. Captains Lefebure and Jones were selected to assist him in his new duties. When the Marquis de la Romana arrived to

* Conolly, vol. i. page 156.

assume the command of the Spanish forces, which had already been routed, and thrown into a state of utter disorganization, Captain Jones was attached to his person. He continued to act in this capacity until General Leith was withdrawn from his post to take command of a brigade in the army under Sir John Moore, then retreating towards the coast. He took Captain Jones as his Aide-de-Camp, and on joining the army that officer was employed on various important Engineer operations, such as blowing up bridges, and otherwise impeding the advance of the French. These duties kept him at the rear of the retiring army in a position of constant peril and most arduous responsibility. He reached Corunna in time to take part in the battle, and afterwards embarked with the rest of the force for England. On arrival at head-quarters he found that his old post as adjutant of the Royal Military Artificers had not been filled up, and he again resumed the duties. Whilst thus engaged, he repeatedly urged the advisability of giving the men a thorough training in field work, and employing them with the army ; but General Mann, the Inspector-General of Fortifications always met his proposals with the statement that "good workmen were like old gold, to be treasured up and not risked in the chances of war." As Jones observed, "On this senseless adage a fine corps of 1,400 men were doomed to inefficiency, and one arm of the service to remain imperfect nearly throughout the war."

In 1809 Jones was promoted to the rank of Captain, and vacated in consequence his regimental Staff appointment. At that time an expeditionary force was being assembled for a descent on Holland, and Colonel Fyers, the Commanding Royal Engineer, selected him to be his Brigade-Major. He served throughout the operations in Zeeland as chief of the Engineer's Staff, and in that capacity carried out all the arrangements for the attack of Rammekens and Flushing. After the failure of the main objects of the expedition, Captain Jones was recalled to England, in the month of October, to assist the Commanding Royal Engineer to prepare plans and documents, in anticipation of an inquiry by the House of Commons into the conduct of the operation.

In March of the following year (1810) he was again ordered on active service in the Peninsula, and immediately on his arrival at Lisbon was employed under Lieutenant-Colonel Fletcher in the construction of the Lines of Torres Vedras. On the departure of Fletcher to join Head-quarters, Captain Jones was put in orders as Commanding Engineer in the South of Portugal, which included the supreme control over the construction of the Lines. When the army retired within the defences, Major Jones was for the first time introduced to Lord Wellington, and the occasion was most unfortunate for him. He had been ordered to guide his Lordship and Staff to

the right of the outer line of works, and took for the purpose a short cut through a portion of the lines in which he had prepared ample and secure communications. It most inopportunely happened that the several brigades, on taking up their positions, had been instructed to strengthen their respective fronts as much as possible. This they thought to accomplish by blocking up every opening, and thus destroying a system of communication which Captain Jones had designed with the greatest care. The consequence was that Lord Wellington, after several fruitless attempts to surmount the obstacles they had thrown up, returned in dudgeon to take the long way round, and it was some time before his poor guide was forgiven.

Major Jones was present as Brigade-Major to the Engineer force engaged in the three sieges of Badajoz, and in that of Ciudad Rodrigo. In the latter he had two very narrow escapes, one of which has been recorded in the narrative of the siege. The other was as follows, as told by himself in his Memoirs :—

"Early in the day he had been in the advanced sap, on the low ground next the river or brook, over which the fog stood so thick as completely to hide the place, although only 180 yards distant. To return home by the trenches was a long round, and circumstances seemed to justify him in walking up the face of the hill. This *trajet* of about 300 yards he commenced without apprehension of discovery, but he had not proceeded twenty yards, when the fog suddenly and instantaneously dispersed under the influence of a brilliant sun. In a moment a shot overtook him, then a second and third, and thus treated as a walking target he became the laugh of all in the trenches. One shot, however, passed so immediately close to his eyes that for some moments the power of vision ceased. He kicked his foot against a stone and fell, to the great triumph of the garrison, as expressed by loud acclamations, but he happily reached the parallel unscathed, and vowed never again to save his legs at the risk of his body."

A few days after this siege Lord Wellington told Captain Jones confidentially that he had been so well pleased with his services that he had recommended him in his despatches for promotion. This resulted in his being gazetted to a Majority, a reward which, as he says, was at that time by no means common, although soon afterwards it was more freely bestowed.

Between the reduction of Ciudad Rodrigo and the last siege of Badajoz Major Jones wrote a letter to the Inspector-General of Fortifications, strongly urging the training and despatch to the seat of war of a large body of Sappers, he having had melancholy experience of the difficulties that had arisen from their absence. There is no doubt that in this letter he gravely overstepped the bounds of discipline, as he went so far as to remind the Inspector-General of

Fortifications that "Nero fiddled whilst Rome burned." He naturally received a somewhat sharp reprimand in reply, though undoubtedly his letter was very effective in pushing on the change of system which led to the utilization of the trained men of the Corps in far larger numbers than hitherto.

In the third siege of Badajoz, Major Jones records a somewhat interesting private incident, strongly marking the difference of character between Lord Wellington and Marshal Beresford. They were discussing in his presence whether the garrison had provided the power to flood the ground in front of the castle, by letting out the water through the arches of the bridge over the Rivillas, that had been blocked up to create the inundation above it. Major Jones volunteered to ascertain the fact by a close inspection. Lord Wellington would not hear of so rash a proceeding, but Marshal Beresford urged that he should go. "Why, he must inevitably be killed," said his Lordship; whereupon the other turned to Jones and said, "Jones, you do not mind the risk, you will not be hit." Fortunately, Lord Wellington was firm, and insisted upon the inspection from a distance, and lent Jones a powerful telescope with which to examine the bridge. This telescope, which was a very large one, nearly led to his capture by a French vidette, as he had dismounted, and was steadying it on his saddle, when they dashed up, and had nearly succeeded in seizing him before he could remount. He ascertained, however, that the bridge was solidly dammed, and that there was no power of letting the water into the river below.

For his services at this siege, Jones received his promotion to the rank of Lieutenant-Colonel, upon which he resigned his Staff appointment, feeling it beneath the position of a Lieutenant-Colonel. Lord Wellington accepted this resignation with the greatest reluctance. Jones also received the gold medal.

After the capture of Badajoz, he was sent to Minorca, to join some troops which had been collected in Sicily for the purpose of making a descent on the east coast of Spain. Of this force he was to be the Commanding Engineer. On their disembarkation at Alicante, Jones found himself commanding a brother-officer far his senior in the service, and to prevent unpleasantness he obtained a transfer to the Quartermaster-General's department. Nothing of any importance was done, and Jones was recalled to Madrid, where Lord Wellington had by that time arrived, in order to report to him personally on the state of affairs. This led to his being retained at head-quarters, and to his taking part in the siege of Burgos. In the narrative of that siege, a description has been given in his own words of the severe wound he received in the ankle, which for ever closed his active service.

The ball had destroyed the ankle-joint, dislodging the broken bones right and left, and driving them into the flesh and muscles. Amputation was not at first considered necessary, and afterwards, from the inflammation of the leg, it became impracticable. In an apparently hopeless condition he was conveyed to Lisbon, the only spring-wagon at head-quarters being allotted for the purpose, and a medical man especially told off to accompany him. Lord Wellington sent with him all his remaining stock of claret for use on the road, and strove in every possible way to show his extreme concern at the casualty.

Colonel Jones remained at Lisbon till the following April, when he had become so enfeebled that, as the only hope of saving his life, he was ordered to England. Here he lingered in great agony for many months, until at length the severer symptoms gradually subsided, and he was eventually restored to convalescence. During this period he published the first edition of his "Sieges in Spain," which at the time brought him into much disfavour with the Board of Ordnance, owing to the outspoken manner in which he showed up their neglect of the numerous and urgent representations made to them, as to the deficiencies of the Engineer service. This ill-will pursued Colonel Jones during the remainder of his career. Nothing but the staunch friendship of the Duke of Wellington prevented his suffering in consequence the total sacrifice of his prospects.

In 1814, after the temporary pacification of Europe, he, still very lame, and unequal to active duty, proposed to furnish to the Board a report on the frontier fortresses likely to be included in any future operations. This was curtly declined, with the notice that "there were officers already on the Continent from whom they could obtain satisfactory reports." He then determined to perform the work on his own responsibility, and passed the summer in making the most detailed inspection of all the frontier fortresses between the Low Countries and France. This work completed, he proceeded to Paris, where he met the Duke of Wellington, who at once told him that he wanted his services as one of the members of an Engineer Commission to draw up a scheme of frontier defence for the new kingdom of the Netherlands. Before this Commission could be set to work, Napoleon had quitted Elba, and nothing was done until the general peace ensued.

The report was then drawn up after a careful scrutiny, and the Duke of Wellington having been placed in supreme control of the expenditure, retained Colonel Jones to be his medium of communication and inspecting officer, whilst the works were being carried out. The Board of Ordnance who had not forgiven him for his "Sieges in Spain," pressed the Duke to name another

officer of superior rank, but the only reply they received was: "I can have no possible objection to receive the officer you recommend; but, without stating my reasons, I will merely say, if my wishes are to have any weight, you will give me Colonel Jones." There was no evading so peremptory a reply, and all further opposition to the Duke's selection was withdrawn.

He thus describes his work as the medium of communication between the Duke and the Dutch executive officers:—

"His duty was to make periodical inspections of each fortress, to ascertain its progress, and see if the approved plan was strictly followed, and to rectify or sanction any deviation from it as might be deemed best, and further to suggest any change of detail or other improvement which might appear advisable. He had also to receive the accounts and check the expenditure, and to make known every occurrence of every nature to his Grace, so that his control might be both efficient and beneficial."

Considering that this duty had to be exercised over a body of Engineer and other officers of a foreign nation, it was difficult to avoid suspicion, jealousy, and dislike. It is much to Jones's credit that, after the first obstacles had been removed, he succeeded in instilling a feeling of confidence, which gradually ripened into friendship with all concerned. Whilst matters were thus progressing favourably in Flanders, the Board of Ordnance made one expiring effort to suppress their enemy. They informed the Duke that Colonel Jones was about to be placed on half-pay, and that, therefore, he could no longer be available for military duty, and must be withdrawn from under his Grace's orders. This the Duke refused to ratify, and once again carried his point, and succeeded in summarily silencing the obnoxious Board.

Jones remained with the head-quarters of the army during the whole period of the occupation of France, making periodical inspections, and reports on the works at the various fortresses in the Netherlands. He invariably accompanied the Duke during his visits, which generally took place about once a year. He narrates an amusing incident of one of these tours. The Duke was usually extremely liberal in his expenditure, and rarely disputed any items which the hotel-keepers might charge, and they were frequently very exorbitant. On one occasion, however, they had ordered in advance that dinner should be prepared for them at Bonn. Circumstances prevented their arrival until late at night, and they had dined on the road. On reaching the hotel they went at once to bed. The next day, amongst the items of the bill was "Soupé non servi 25 frs." This struck the Duke as most unreasonable, the dinner not having been eaten, and he remonstrated with the landlord, who in vain protested that everything had been pre-

pared, and must be paid for. The Duke was obstinate, and at last said, "Jones, I will walk on; you must wait with the carriage, and make this man listen to reason." The result was that Jones paid the 25 francs out of his own pocket, and neither the Duke nor the landlord knew how the matter had been settled. He also tells a very neat compliment paid by Louis XVIII. to the Duke. Returning from one of their tours, they reached Paris on the king's fête-day, and went to the palace to pay their respects. In conversation the King asked the Duke in what year he was born. The reply was, 1769. "The same year as Bonaparte," said the King. "La Providence nous devait cette recompense la."

On the withdrawal of the army of occupation, the Duke of Wellington returned to England to assume the duties of Master-General of the Ordnance, and he made Colonel Jones Commanding Engineer of the Woolwich district, so as to have him close at hand with reference to any questions that might arise as to the Netherlands fortresses. This post he took up in January, 1819. The annual tours continued until the year 1830. The Belgian revolt, involving as it did the loss to the Dutch of all the fortresses that had been strengthened with such labour and expenditure to secure the frontier of the Low Countries, rendered it all practically useless. Whilst this change of masters was still unaccomplished, the Duke sent Colonel Jones on a confidential tour of inspection in the Netherlands, and during this time he became the trusted adviser of the King, and his son the Prince of Orange. The loss of the Netherlands to the kingdom of Holland brought to a close the service in which Colonel Jones had been for so many years engaged, and advantage was taken of the opportunity of the Coronation of William IV., in the following year, to include his name amongst the batch of baronets then created. He had been Aide-de-Camp to the King since the year 1825. In 1833 he quitted his post at Woolwich, his health having become so feeble that he was unable to continue his military duties. In 1837 he was promoted to the rank of Major-General, and was also nominated a K.C.B. He died in February, 1843, after much suffering.

The Royal Engineers erected a statue to his memory, which now stands in the south transept of St. Paul's Cathedral. It is a very fine work, from the chisel of Mr. Behnes.

Captain JAMES VETCH

entered the Corps of Royal Engineers in 1807. In 1810 he was sent to the Peninsula, where he joined the division of Sir Thomas Graham at Cadiz. He was present at the battle of Barrossa in the following year, and was selected by Graham to be the bearer of his despatch to Gibraltar. Lieutenant Vetch afterwards joined the force engaged in the third siege of Badajoz, and at the assault was employed in effecting a lodgment in the lunette of San Roque. He remained in the Peninsula till 1814, but was not afterwards engaged in any of the more important actions. In 1821 he was appointed to the Ordnance Survey, and conducted the triangulation of the Orkney, Shetland, and Western Islands of Scotland. Having gone on half-pay in 1824 he proceeded to Mexico, where he engaged in antiquarian research. On his return to England he presented his valuable collection of Mexican antiquities to the British Museum, and contributed to the Geographical Society a paper on "The Monuments and Relics of the Ancient Inhabitants of New Spain." In 1836, Captain Vetch was appointed one of the Commissioners for settling the Irish borough boundaries. In 1846 he was made Consulting Engineer to the Admiralty. Captain Vetch was a Fellow of the Royal, Geographical, and Geological Societies, and an Associate of the Institute of Civil Engineers. For his war services he received the Peninsular medal with clasps for Barrossa and Badajoz. He died in 1869.

Major-General ANTHONY EMMETT

obtained his commission in 1808, and in the following year joined the army in the Peninsula. With the exception of the time during which he was invalided to England on account of the severe wound he received at the capture of Badajoz, he served uninterruptedly throughout the war. He was at the Lines of Torres Vedras, and engaged in the skirmishes with the French during the time they remained in the vicinity. He served in all the three sieges of Badajoz, as well as at that of Ciudad Rodrigo. At the capture of Badajoz, he led the Portuguese column to the assault of the bastion of San Vicente, when he was very severely wounded. Whilst in England, recovering from this wound, he was promoted Captain, and returned in that rank to the Peninsula.

He was with the Second Division throughout the last campaign of the war, and was in all the actions in which that Division was engaged, including the battles of Orthes and Toulouse. The Peninsular War had no sooner been brought to a successful termination, than he joined the expedition against New Orleans under General Keane. There he took part in all the actions that were fought, including the assault on the enemy's lines and the siege of Fort Bowyer, after which his war services ended, he having at that early age been present at more active operations in the field than any Engineer of his standing. He was selected as Commanding Royal Engineer at St. Helena, during the residence of Napoleon in that island, and remained there until the prisoner's death. For his services in the Peninsula he received the War Medal with four clasps. He retired from the Corps as a Major-General, and died in 1872, aged 82 years. He was a man who had on many occasions displayed the most conspicuous bravery, and was well known for his readiness to undertake hazardous duties, and, as is so often the case, this spirit was accompanied by a bearing of the most modest and unassuming character. Few of those who knew him in later life would have guessed what a warrior he had been in his youth.

Lieutenant-General Sir HARRY DAVID JONES, G.C.B.,

joined the Corps of Royal Engineers from the Royal Military Academy, on September 17th, 1808, at the age of 17½ years. After a brief service at Dover, where he was employed in the superintendence of the extensive works of fortification then in progress, he was ordered, in 1809, to join the force despatched to the Scheldt, under the Earl of Chatham, for the capture of Antwerp, and the other adjacent fortresses, including the destruction of the French naval arsenals on the river. He served throughout that ill-fated expedition, including the attack on and capture of the fortress of Flushing. In common with so many others, he suffered from the malarial fever by which the army was prostrated whilst stationed in the Island of Walcheren.

The expedition having proved a failure as regards its principal objects, and being in consequence recalled to England, Lieutenant Jones, though barely recovered from the fever, was sent to Spain at the close of the year, to join the allied forces blockaded by the French at Cadiz, and in the Isle de Leon. There he took part in the defence, and was employed in throwing up the line of works by

which the city and island were covered. From Cadiz he was sent with the force destined for the relief of Tarragona, then also being besieged by the French. He afterwards joined Lord Wellington's army, and was present at the third siege and capture of Badajoz.

He remained with the army and took part in most of its subsequent exploits. At the battle of Vittoria he was attached to the Fifth Division, under General Oswald, and so distinguished himself in that action that he was recommended for special promotion. This, however, was refused, on the ground that being only a Subaltern, he was ineligible for promotion out of his turn. He served as Adjutant at the Siege of St. Sebastian, in the right or Chofre Hill attack, and, as has already been narrated in the account of that siege in Chapter XIV., Part I., was wounded and taken prisoner at the first assault on July 25th. Whilst in this position he was exposed to the crushing bombardment of the castle after the capture of the town. A large number of casualties occurred amongst his fellow-prisoners, crowded together in the hospital and utterly unprovided with the means of procuring cover, but he himself fortunately escaped unhurt.

Sir John Burgoyne, in a letter to his wife, written from Elvas in 1827, when he was acting as Commanding Royal Engineer to Sir W. Clinton's expeditionary force in Portugal, has the following passage:—

"This morning a brigadier-general called on me and enquired after Captain Jones; they had been prisoners together at St. Sebastian. The French offered Jones money for his bills, but did not pay the Portuguese officer the same compliment. Jones, however, shared his purse with him, and, he says, rendered him a great service, which he shall never forget."

Having recovered from his wounds he resumed active service, and was present at the battle of Nivelle; and at the operations before Bayonne, including the passage of the Bidassoa as also that of the Nive. For his conduct on the day of the battle of Nivelle he was once more recommended for promotion, and this time successfully, his commission as Second Captain being dated on November 11th, 1813, the day after the battle. The thanks of the Master-General were at the same time conveyed to him by a circular to the Corps, through the Inspector-General of Fortifications.

The Peninsular War being over, and that with America having broken out, Captain Jones joined the expeditionary force commanded by Sir John Lambert, destined to act against New Orleans. Whilst thus engaged he was sent on a special mission to that city under a flag of truce. Returning from America without having had any opportunity for distinction, he joined

the Duke of Wellington's army in France, shortly after the battle of Waterloo, and was present at the capture of Paris. He was placed in command of the Royal Engineers at Montmartre, and in the following year was appointed a Commissioner with the Prussian army of occupation, which post he held till 1818.

Returning to England he was employed in the ordinary duties of the Corps, and in 1824, was made Adjutant at the Royal Engineer Establishment at Chatham, which post he retained until his promotion to the rank of First Captain in 1826, when he was sent to Malta.

In 1833 he was ordered to proceed to Constantinople to report on the defences of the Dardanelles and Bosphorus, for which he once more received the public thanks of the Master-General.

On his return home he was seconded from the active service of the Corps in order to undertake a succession of civil duties, firstly as Commissioner for Municipal Boundaries in England, then under the Board for the Improvement of the Shannon Navigation, and lastly as Commissioner for Irish Municipal Boundaries, On the completion of his ten years of seconded service he returned to active duty for a short time, but was soon again seconded as a Commissioner for the Shannon Navigation. In 1845 he became Chairman of the Board of Public Works in Ireland.

In 1851 he once again returned to the Corps, in order to take up the duties of Director at the School of Military Engineering, in succession to Sir Frederick Smith. War having broken out with Russia in the spring of 1854, Colonel Jones was promoted to the rank of Brigadier-General in order to assume the command of the land forces to be employed in the Baltic, and in that capacity he embarked on board H.M.S. *Duke of Wellington*, on which ship Admiral Sir Charles Napier had hoisted his flag. In August he attacked and captured the fortifications on the island of Bomarsund after a short siege. Having demolished the works, and rendered the post useless to the Russians, it was abandoned, and General Jones returned to England.

He was promoted to the rank of Major-General in December, 1854, and was shortly after despatched to the Crimea, to assume the post of Commanding Royal Engineer, then being vacated by Sir John Burgoyne. On his arrival he found the siege of Sebastopol almost at a standstill owing to the extraordinary difficulties that had arisen, partly by the extreme severity of the winter, and partly by the deficiency both of men and *matériel*. His untiring energy and zeal proved of the utmost value in this important post, and from the moment of his arrival on the scene of action he became the life and soul of the attack.

He was severely wounded in the forehead by a spent grape-shot,

on June 18th, during the unsuccessful assault on the Redan, and received the special notice of Lord Raglan for his services on that day. The result of his wound and of the exertions he had made, was a severe attack of illness, from which he was still suffering when the final assault on the fortress was made on September 8th. Being unable to stand he caused himself to be carried to the trenches on a stretcher, in order to be present on the occasion, and to give the General in command, Sir James Simpson, the benefit of his advice. The result of the day's exposure was an aggravation of his illness, which necessitated his removal to Scutari, and in October he was ordered home to England, all active operations in the Crimea having been suspended.

For his services during the war he was created a K.C.B., and was further decorated with the First Class of the Military Order of Savoy, and the Second Class of the Medjidie.

In January, 1856, he was sent to Paris as a member of the Council of War assembled in that city under the presidency of the Emperor Napoleon. In the course of the same year he was appointed a member of the Commission on Purchase in the Army, of which the Duke of Somerset was President. In the month of May, 1856, he was made Governor of the Royal Military and Staff Colleges at Sandhurst, which posts he held till his death. Whilst occupying this position, he was repeatedly called on by the Government to undertake other duties, many of them of an arduous character. The most important of these was that of President of the Defence Commission, which involved considerable bodily as well as mental exertion. The result of that Commission has been detailed in the Chapter on the National Defences.

In 1856 Sir Harry Jones was placed on the list of officers receiving rewards for "Distinguished or Meritorious Services," a recognition of his devotion to the varied and important duties he had been called on to perform during a period of forty-eight years. On June 6th, 1860, he was promoted to the rank of Lieutenant-General, and almost immediately afterwards became a Colonel-Commandant in the Corps.

He died at Sandhurst on August 2nd, 1866, and was buried in the cemetery attached to the College.

Major-General Sir WILLIAM REID, K.C.B.,

entered the Corps of Royal Engineers in 1809, and in the following year joined the army in Spain. His services throughout the Peninsular War are recorded in the Chapters dealing with that subject. He was present at the sieges of Badajoz (2), Ciudad Rodrigo, Burgos and San Sebastian, and at the battles of Salamanca, Vittoria, Nivelle, Nive and Toulouse. In the siege of San Sebastian it has been stated that Lieutenant Reid was wounded in the first unsuccessful assault. The details of this injury were somewhat peculiar. He had been struck by a musket-shot in the neck, and fell covered with blood which streamed from his mouth and nostrils. On removing his black silk handkerchief it was found pressed into the wound, and on drawing it out, the bullet came with it. The injury was considered so severe that at first it was reported mortal. He, however, recovered rapidly from its effects. He was wounded no less than four times during the war, and had three horses shot under him. The Duke of Wellington used to speak of him and of his brother subaltern, Lieutenant Wright, R.E., as "my favourites Read and Write." He served in the American Campaign of 1814, and from thence returned to the Duke's army in the Netherlands in 1815, but joined it too late for the battle of Waterloo. He was at the capture and subsequent occupation of Paris. In the following year he was with the fleet at the bombardment of Algiers under Lord Exmouth.

Reid had now become a Captain, and he naturally made an effort to obtain some promotion for his exceptionally brilliant services. He was in possession of the strongest recommendations from the officers under whom he had been placed. The following is one from Sir Richard Fletcher, addressed to the Inspector-General of Fortifications, and dated at Elvas, March 15th, 1812 :—

"I take the liberty to recommend to your consideration the peculiar merits of Lieut. Reid, of the Corps of Engineers. This valuable officer was mentioned in the highest terms by Lieut.-Col. Harcourt, Commanding the 40th Regiment, for his conduct during a sortie made by the enemy at the siege of Badajos, in the month of May, 1811. A copy of the Lieut.-Col.'s report on this occasion I had the honour to forward to your office. About three months ago, Lieut. Reid was named to Lord Wellington in the strongest manner by General Don Carlos D'España, of the Spanish service, for his ability and zeal during an expedition under that officer, and he was afterwards particularly mentioned in his Lord. ship's Dispatch. During the late siege of Ciudad Rodrigo (at which he was wounded), his conduct was such as to add greatly to his former claims. On the whole, I feel Lieut. Reid's merits & services to have

been so conspicuous, that I venture, Sir, to recommend him to your consideration for the Brevet rank of Captain in the army."

"I am, &c.,
"(Sd.) Rd. Fletcher,
"Lt.-Col. Comg. Royal Engs."

Extract from the Orders of the 6th Division commanded by General Sir Henry Clinton, after the siege of the Forts of Salamanca, 1812:—

"The zeal and conspicuously gallant conduct of Lieut. Reid of the Royal Engineers, has (*sic*) not escaped the particular attention of the Major-Genl., & he trusts they will be duly appreciated by the Commander of the Forces."

Fletcher's efforts were not successful. The promotion of a Lieutenant of the Royal Engineers to the rank of Captain out of his turn was without precedent, and the Master-General declined to create one. It was left for a subaltern, nearly seventy years later, to perform a deed which so struck the public imagination, that the authorities were compelled to break through the iron rule, and to promote the officer commanding in the memorable defence of Rorke's Drift to the rank of Captain, coupled with a Brevet Majority, two years before he would have gained the step in the ordinary course.

The following letter was afterwards written by the General in command of the Light Division, dated August 27th, 1813, addressed to Sir Richard Fletcher:—

"My dear Sir Richard,

"Seeing the Artillery and other officers of this army so handsomely rewarded for their signalised services in our present campaign, I cannot in justice to Lieut. Reid of your Corps, attached to the Light Division under my command, refrain of mentioning to you his very gallant and distinguished conduct while so attached, and to beg you will use your interest in his behalf, that something may also be done for him so deserving of reward. His activity and zeal for the service in general will seldom be met with, and I am confident cannot be surpassed; this I know you are acquainted with, I therefore only beg leave to mention some particular occasions when he distinguished himself during the time he was with this Division. On the 18th of June, when I happened to meet unexpectedly on the march a French Division, he not only did his utmost in reconnoitring the strength and the direction it took, but he also directed the movement of three Rifle companies in such an able and spirited manner that I cannot help ascribing in a great part the success of the day to it. On the 19th, when the 4th Division came up with the enemy's rear-guard, and Lord Wellington ordered me to attack their left flank, I gave him the direction of it with one Caçador Battalion, and I cannot sufficiently express my satisfaction in the way he performed this service. In the battle of Vittoria I derived the greatest assistance

from his judicious advices and unrelaxing activity. He was the whole day constantly employed in rendering himself useful, exposing himself to the hottest fire, and had his horse killed under him. When we afterwards entered the Pyrenees, where the difficulty of the ground gives such ample scope for an Engineer officer in particular, he exerted his talents in ascertaining and sketching of the position of the enemy, and in finding out the best roads and ways leading to it. Of Lieut. Reid's gallant conduct at the present siege of San Sebastian, and that on former occasions, you are better acquainted with than myself. I can, therefore, only add that I should feel exceedingly happy if you should succeed in obtaining some reward for a young man who is so highly deserving of it.

"I remain, with great regard,
"My dear Sir Richard,
"Yours truly and faithfully,
"CHAS. ALTEN, M.-Genl."

This letter was penned four days after Sir Richard Fletcher had been killed at San Sebastian, and like the others produced no result. Probably, in the sad circumstances, it was never forwarded to the higher authorities. At all events, poor Reid had to await the ordinary course, and obtained his Captaincy by strict seniority. He, however, naturally imagined that when he had gained this grade his services would entitle him to his Brevet Majority. His friends (and they were numerous and powerful) exerted themselves in his behalf.

Lord Exmouth, under whose eye he had served at the bombardment of Algiers, wrote strongly in his favour to the Duke of Wellington, who replied as follows :—

"Paris, March 8th, 1817.

"My dear Lord,

"I have received by this last post your Lordship's letter of the 26th ult., and it has given me the greatest pleasure to have it in my power to join my recommendation to that of your Lordship in favour of Capt. Reid of the Royal Engineers. I have written by this post in his favour to Lord Mulgrave in the strongest terms. . . . ."

Lord Exmouth forwarded this letter, with his own recommendation, to Lord Mulgrave, and received a reply which promised nothing, although most flatteringly expressed :—

"It is no ordinary testimony of the merits of Captain Reid to have excited the warm interest of two such Commanders of his services."

The fact was that most unfortunately for Reid's interests, a matter was at the moment under dispute in which he was not in the slightest degree concerned, but which proved for the time fatal to his prospects. A Battalion Commandantship had fallen vacant in the Royal Engineers, and the question in dispute was

whether it was to be filled regimentally, or by the officer senior in army rank. It so chanced that the latter was not popular, and that the former was considered to have really the best claim independent of his regimental seniority. Under these circumstances the Master-General had come to a determination, that he would not recommend any officer whatever for brevet promotion until the question had been decided that such brevet rank should not count as a stepping-stone to the battalion.

Hence, in spite of the unusually strong claims which Reid had, backed as they were by such powerful friends, Lord Mulgrave stood firm and declined to promote him. His disappointments were not yet all over. Although Lord Mulgrave would not give him a Majority, he felt the hardship of the case and recommended him for the Order of the Bath. This was refused by Lord Bathurst on the ground that it could not be given to anyone under the rank of a Field Officer.

This additional disappointment was very severe, and Captain Reid felt it deeply. He wrote one last appeal to the Master-General, and as it forms an excellent recapitulation of his services, it is given here :—

"My Lord,

"I beg to apologise, after the many letters which have passed concerning my promotion, for troubling your Lordship again with another. But I feel it due to myself, to all the Captains of Engineers, and to all those who are yet to be Captains, to ask (and I do it with profound respect) whether Captains of Engineers are not to continue to look forward to the same reward by Brevet as Captains in other Corps. That such a regulation would deeply affect the welfare of our Corps I feel no doubt but that your Lordship will be sensible of, and we may still trust that any officer shewing sufficient merit, will receive the reward due to him. I have been ambitious of meriting Brevet Promotion, and I flattered myself that by my good fortune and exertions I had gained it. For, although I shall not presume to say that of all the Captains of Engineers I am the fittest to be advanced in the service of my country, (for we have men of first-rate talents amongst us) yet I will so far presume, as to declare that I have been oftener engaged with the enemy than any Captain of Engineers, either those who have received Brevet rank, or who have not. If there should be any of the above number who can vie with me in point of applauses of Commanders for general conduct while engaged, they have been much less engaged, and they are all Brevet Majors, or Lieutenant-Colonels, with the order of merit, the third Order of the Bath. I have been in thirty separate affairs with the enemy, among which are five general actions and seven sieges, besides Algiers. In the sieges I was employed in twelve assaults, the heads of three of which I guided, and by good fortune I was engaged in all the large sallies made in these sieges, and all these, although separate instances of being warmly engaged with the enemy, are not included in

the thirty separate affairs before mentioned. I can add, still more, My Lord, that there are but two officers in the whole Corps of Engineers that have been more under fire than myself. These are Lieutenant-Colonel Jones & Burgoyne. With such claims as these, I think your Lordship will excuse my numerous appeals, and I trust in your candour to forgive my entreating you again for Brevet promotion.

"I have, &c.,

"(Sd.) Wm. Reid,

"Capt. Royal Engineers."

Most fortunately for Reid, by the time this letter was written, the question of giving the Colonelcy of the Battalions had been decided in favour of Regimental, and not Army rank. The difficulty, therefore, of promoting him was now at an end. On March 26th, 1817, five weeks after the date of the above, the Inspector-General of Fortifications received the following communication:—

"I am directed by the Master-General, to acquaint you that His Royal Highness the Prince Regent, has been pleased to confer the Brevet Rank of Major in the Army on Second Captain William Reid, of the Royal Engineers, on account of the representation which has been forwarded by his Lordship, of the gallant and distinguished conduct of that officer in several instances while on service.

"(Sd.) S. R. Chapman."

Had this promotion not been given, Captain Reid had fully decided upon retiring from the service. The Corps generally, as well as he himself, may be congratulated that the step was averted, and that he lived to bring even more credit upon the Engineers in the years that were to come, than he had already done in those that were past.

From this time his fate, like that of so many of his brother-officers, was to carry on the ordinary peace duties of his profession, with no special opportunity for raising himself out of the crowd for a long time. He had not, however, forgotten his Peninsular experiences, and when De Lacy Evans raised his Spanish Legion, Reid hastened to join him. He himself informed the writer that whilst in that service he was standing on the very spot where he had so many years before been wounded in the neck at San Sebastian, and had just informed a brother officer of the fact, when he was again wounded, and, curiously enough, also in the neck.

This was his last experience of war, and his career was from thenceforth to be equally brilliant and distinguished in peace duties. He was quartered in Barbados in 1832, the year after the fearful hurricane, which had devastated the island, causing the death of 1,500 persons, and a destruction of property valued at upwards of a million and a-half sterling. The effects of this hurri-

cane drew Reid's attention to the subject of storms, and he commenced an earnest and most laborious study of the question, by the collection of the log-books of British men-of-war and merchant ships. The result of this study was that, in 1838, he published a most valuable work, entitled "An Attempt to develope the Laws of Storms." This book laid down for the guidance of the seaman broad general rules, which should enable him to shelter himself from the worst effects of circular storms or whirlwinds. He showed how it could be determined, when a ship should run before the hurricane, when it should lie to, and on what tack, so as to avoid being taken aback by the veering of the wind, and also how to anticipate its coming changes, and shape such a course as should best turn these to account. This work has been of incalculable benefit to the sailor, and has been translated into several foreign languages, Chinese amongst the number. He was elected a Fellow of the Royal Society, as a consequence of this valuable publication. In the following year, Lieutenant-Colonel Reid was appointed Governor of Bermuda, where he remained for seven years. The beneficial effects of his rule in that island, were so great, that he received the title of "The Good Governor," and in the year 1859, thirteen years after he had left the island, the Legislature voted a sum of £300, to "obtain and erect a permanent memorial of Governor Reid, to be placed outside the Session House or Council Chamber, in the Town of Hamilton." In one of the volumes of "Household Words," a long article was devoted to the work carried on by Governor Reid, under the title of "The Model Governor."

In 1846, Colonel Reid was transferred from Bermuda to the more important Government of Barbados and the Windward Islands. There also he distinguished himself in his efforts to advance the welfare of the people, by improvements in agriculture, education, and moral training.

Owing to a disagreement with the Colonial Office, on a question of his administration at St. Lucia, which has been referred to in Chapter V., Part III., he resigned his government and returned to England, and to his Corps duties, in the autumn of 1848.

He was Commanding Royal Engineer at Woolwich at the time of the Great Exhibition of 1851, and in the Chapter detailing Engineer work in connection therewith, it has been shown how Colonel Reid was appointed Chairman of the Executive Committee. In the Royal Society's Memoir on his life it is recorded :—

"His singular simplicity of manner, and total absence of pretension, caused the distinguished men with whom he was associated on that occasion to wonder at first what had led to his selection for the office. They soon discovered under that simplicity the patient but genuine

enthusiasm, the varied experience, the calm and even temper, and the devotion to the duties of the moment, whatever they might be, which eminently fitted him for it."

In a Colonial newspaper at this period, the following graphic picture of him appeared:—

"It was curious to see the enraged and frantic exhibitor (the foreigner particularly) swearing at the injustice and favouritism which had consigned his article to some obscure corner, or some bad light, or some other fancied disadvantage, pass into the presence of the Chairman of the Executive Committee, and presently emerge all cheerfulness and contentment. It almost seemed as if he had passed through some talismanic process to have undergone the change; but such was the wonderful tact and temper of the Chairman, that nobody ever left him otherwise than pleased, and convinced that justice had been done to him."

As a result of his valuable services at this Exhibition, he was created a K.C.B., and given the Government of Malta. Here again he developed the same beneficent energy which had so endeared him to those who had benefited by his rule in his former governments. But perhaps even beyond these peaceful achievements, his fame at this epoch of his life will be more founded on the eminent services he was able to render to the British army in the Crimea. It was a most fortunate thing that at that great crisis there were two men in authority at Malta capable of appreciating the position of affairs, and not afraid to assume responsibility in connection with its amendment. The Governor, Sir William Reid, and the Admiral at the station, Sir Houston Stewart, worked hand in hand, and to their untiring zeal and clear foresight it is due that so much was done, and promptly done, to furnish the sadly needed help that seemed elsewhere so difficult to obtain.

The following letters, out of many which at this time he wrote to Sir John Burgoyne, may be taken as a fair sample of his zeal and energy at the most trying time of the winter:—

"Malta, 4th December, 1854.

"My dear Sir John,

"I received to-night your letter of the 19th November, and as you only mention one as received from me, several others could not have reached you. They related to guns, mortars, and ammunition sent to you. I feel it useless to wait till Lord Raglan asks. It is for us to send all and everything which we think may help you in your difficulties. I shall see if I can send you some warm clothing. Along with Admiral Stewart I am contriving trousers, and trying the Malta Nanking blanketing for the purpose. At the dockyard he is making stoves and camp cooking furnaces to burn common coal. He has bought up all the planks and boards in Malta for hutting you, and sending tools and nails. To-morrow I am going to get him to make you some chevaux-de-frise. I have

recommended the Duke of Newcastle to send you a large supply to help you to render a few points in Lord Raglan's position strong points of support. A single line may be got through, but two or three deep, entangled together, and put in places covered from cannon, they form an obstacle very difficult to be overcome. Forage we know you want much, and I am always urging as much as possible to be sent. If you had more forage, we should send Lord Raglan more mules and carts. . . . I am astonished at the ships not putting to sea when the gale of the 14th was setting in. I believe the wind was southerly, which would have enabled them to gain an offing on the port tack." . . . .

And again on December 9th:—

"I would have sent the 62nd earlier, and on Admiral Houston Stewart's first suggestion (for he first suggested its going); but I am cautious not to overact the Governor, but consult with the General and Admiral. . . . . I have written both officially and privately to Sir Robert Gardiner" (Governor of Gibraltar), "begging him to send on gunpowder, projectiles, &c., by every possible opportunity to us in Malta to fill up our void by supplying you. And I have written to the Duke of Newcastle advising his Grace to send you four or five miles of tram road."

Sir William Reid's exertions at Malta told heavily on his health. There is no doubt that during this eventful period the anxieties and strain of mind he went through, laid the seeds of the illness that caused his death. He, however, continued at his post until the period for which he was appointed had expired, and returned home in 1858.

He had been promoted to the rank of Major-General in 1856.

He did not long survive his retirement from the active duties of his profession, as he died after a very short illness, on October 31st, 1858.

It is much to be regretted that a vast mass of valuable records and correspondence connected with Sir William Reid's numerous services were burnt at the great fire in the Pantechnicon. This will probably prevent the compilation of any really satisfactory history of his most instructive and eventful life.

This brief sketch of a highly interesting career may fittingly be concluded by quoting a very thoughtful and appreciative obituary notice which appeared in a Bermudian paper:—

"The merchant vessels, American as well as English, in the different ports of these Islands, hoisted their colours at half-mast on receipt of the sad intelligence of the death of Sir William Reid. . . . As Governor of these Islands he left behind him here a name and reputation which have ever been warmly cherished by all classes of the community. The secret of this sentiment of esteem, unhappily too unusual a phenomenon in colonial history, may be found, we believe, in the conviction which all, whether friendly or hostile to Governor Reid's plans, felt of the perfect

sincerity of his efforts to promote the good of the colony. That he was single-hearted in this pursuit none ever doubted, and that his efforts were in general as successful as they were sincere, is most unanimously admitted. By his able and conscientious discharge of his high duties, Sir William Reid earned and obtained the approbation of the Crown, and the confidence, nay even the affection of those whom he governed. . . . Inflexibly just, rigidly conscientious, and wholly disinterested in his public as in private life, Governor Reid possessed many of the faculties which enter into one's ideal of a great and good man. To these generous qualities of the soul were added no small intellectual capacity, and a determined perseverance and industry, which would have fitted him for much more conspicuous posts than those which it was his lot to fill. As a Governor he was constantly intent on tracing with precision the narrow path of duty, and when he had discovered it his courage was inflexible and his constancy unconquerable in the pursuit of it . . . It must be allowed that Governor Reid's administration of this Government not only was successful at the time, but in fact proved an important era in our humble history. His name still continues, and will long continue, to be identified with the material prosperity of the colony, which prosperity he developed to an extent not before dreamed of."

It should be remembered that this was written twelve years after Governor Reid had quitted the island.

General Sir JOHN CHEAPE, G.C.B.,

obtained his commission in the Bengal Engineers in 1809. He served with the forces of the Marquis of Hastings in the Pindaree war of 1815-16. He also took part in the operations carried out by the Nerbudda field force under General Adams in 1817, and in the following year in those of the force under Doveton and Malcolm. He was through the first Burmese war, from 1824 to 1826. From this time until 1848 he was employed in various Engineer duties without further war service, but in that year he was appointed to command the Engineers during the second portion of the siege of Mooltan. Here, in spite of every difficulty owing to insufficient appliances, the smallness of the British force, and the disinclination of the Bengal Sepoys to work in the trenches, he carried the operation to a successful conclusion. He was afterwards present at the battle of Goojerat. For these services he was appointed Aide-de-Camp to the Queen, and made a C.B. In the second Burmese war of 1852-3, he was second in command of the army, and on the departure of General Goodwin, the command in chief devolved on him. At the termination of the campaign he was created a K.C.B., and in 1865 he was advanced to the dignity of G.C.B. He died in 1875, aged 83 years.

Captain THOMAS DRUMMOND

joined the Engineers in the summer of 1815, at a period most fatal to his prospects in the way of promotion. The reductions that followed the conclusion of the war rendered it impossible for those who were then entering the Corps to look forward to anything but a dreary length of service in the junior grades. Drummond, a man of marvellous inventive genius, an experimenter and investigator, whose patience and perseverance were only to be equalled by his power of grasping at results, did not allow the gloominess of his military prospects to throw a blight over his energies.

We find him, even as a student at Chatham, designing a new form of pontoon to supersede that which had proved so faulty in the late war. The form he adopted was that of a boat like a man-of-war's gig, except that it was sharp at both ends. It was built in sections, partly for the convenience of transport and partly to secure the retention of buoyancy in case of damage, and the partitions, when bolted together, fell under the thwarts. This was one of four, the designs of different competitors, which were sent up to London for selection. Drummond was not successful, the Blanshard pontoon having carried off the palm.

Whilst at Chatham he very nearly lost his life by drowning. The incident, which gives a good insight into his character, is thus described by Larcom, in his "Professional life of Drummond":—

"He was charged with the construction for practice of a bridge of casks in the rapid current of the Medway at Rochester Bridge, and having previously made piers of the casks in the still water above the bridge, it was necessary to move them through the rapids to get them below the bridge. The piers were, as usual, lashed two and two for security; but one remained, and as its removal was likely to involve some danger, Mr. Drummond determined to go on it himself. There were two soldiers on the pier, one of whom showed a little apprehension at setting off. Drummond placed this man next himself, and desired them both to sit quite still. They passed through the arch in safety, when the man, who had previously shewn apprehension, wishing by activity to restore himself to his officer's good opinion, got suddenly up to assist in making fast to the buoy; in an instant the pier upset, all hands were immersed in the water, and the man who had caused the accident, being on his feet, was thrown from the pier and drowned. Mr. Drummond and the other man clung to the pier, and he afterwards described his sensations when finding his body swept by the current against the underside of the pier. His last recollection was a determination to cling to one side of it, in hopes the depression of that side might be noticed. This presence of mind saved him and his comrade, for, as he expected, a brother-officer (Fitzgerald) noticing the lowness of one side, sprang from a boat upon

the other, and immediately the heads of poor Drummond and the sapper appeared above the water. Drummond was senseless, with the ropes clenched firmly in his hands."

He joined the Ordnance Survey under Colby in 1820. and was employed in the triangulation in Scotland and afterwards in England. It was not, however, until the Irish Survey was started that his powers as an inventor and experimentalist were to show themselves. In the Chapter on that Survey a sketch has been given of Drummond's heliostat and light, and also of his share in the development of Colby's compensation measurement bars. Before these could be brought into practical use much detail had to be worked out, and here it was that Drummond's peculiar powers found a vent. The first difficulty encountered in applying Colby's principle, was the fact that the rates of changing temperature of the two metals (brass and iron) differed. This he overcame by alterations in the surface of the iron bar, the brass remaining constant. It required numerous careful experiments to decide what these alterations should be. Upwards of ninety, indeed, were made, and a table compiled giving the length of the bars under temperatures varying from 40° to 200°. The next thing to determine was the precise position of the compensating point. The mode of effecting this was thus described by Drummond :—

"The approximate position of the compensated point was in the first instance calculated from the mean expansions of brass and iron, but being found to differ from this determination it became necessary to alter its distance from the pivots. There being no adjustment for this purpose a slip of silver was attached to the tongue, and a series of dots marked upon it, so as to extend on either side beyond the true but unknown compensation point. These dots were within ·0527 inch of each other, and were brought under the microscope in quick succession by means of transverse screws, and when the position of the true compensated point was determined with respect to these dots, the plate was removed, a silver pin inserted (in the tongue) at the requisite distance, and a dot marked upon it."

The unremitting application with which Drummond had pursued these investigations brought on a severe illness, and after he had proceeded to Ireland to carry on the practical operations of the Survey the hardships and exposure to which he was subjected once more prostrated him. On this second occasion he was discovered by a doctor in a miserable hut swamped in water, and unable to move. A gentleman living in the neighbourhood having heard of his deplorable condition insisted upon carrying him off. He had him wrapped in blankets, placed in his carriage, and driven to his hospitable house, where he was carefully nursed

for six weeks, until he was sufficiently convalescent to be sent home. His sister thus speaks of the incident :—

"He was about a fortnight with us before he was able to go out just a little. I remember the Survey people wanted to stop his pay. He wrote them a threatening letter. 'Was there ever anything equal to this?' he said. 'They throw away thousands of pounds, and would rob me when I am become disabled in their service.'"

There is no doubt that these two illnesses laid the seeds of the disease that carried him off at such an early age.

Returning to London in the autumn of 1829, he once more turned his attention to the development of his light. It has already been recorded how successful the application of this light was on the mountain of Slieve Snaght. It may here be mentioned that on his first application of the principle, before he proceeded to Ireland, he exhibited the light at the Armoury in the Tower to a number of *savans*. Sir John Herschell, who was present, thus describes the scene in a letter written to Mrs. Drummond, after her husband's death :—

"The common Argand burner and parabolic reflector of a British light-house were first exhibited, the room being darkened, and with considerable effect. Fresnel's superb lamp was next disclosed, at whose superior effect the other seemed to dwindle, and showed in a manner quite subordinate. But when the gas began to play, the lime being now brought to its full ignition, and the screen suddenly removed, a glare shone forth overpowering, and, as it were, annihilating, both its predecessors, which appeared by its side, the one as a feeble gleam which it required attention to see, the other like a mere plate of heated metal. A shout of triumph and admiration burst from all present. Prisms to analyse the rays, photometric contrivances to measure their intensity, and screens to cast shadows were speedily in requisition, and the scene was one of extraordinary excitement.

The light thus exhibited, and afterwards used on the Irish Survey was produced by oxygen passing through the flame of spirits of wine. He now proposed, as a matter of economy, to substitute hydrogen gas for the flame of alcohol. In its new form the apparatus was arranged as follows : The oxygen and hydrogen gases were separately conducted into a mixing chamber, the former being projected horizontally, and the latter vertically through minute apertures. The blended gases, after passing through wire gauze, to ensure more complete mixture, issued through two gas jets and played upon the lime ball, which was made to rotate slowly in order to diffuse uniform heat, and to prevent unequal wasting. In this form he carried out numerous experiments by order of the Trinity House. Most of these took place in a small lighthouse at Purfleet. Captain Basil Hall, who witnessed some

of the experiments, from the Trinity Wharf at Blackwall, writes thus of the Drummond light:—

"Experiment IV. The fourth light was that which you have devised, and which, instead of the clumsy word 'lime,' ought to bear the name of its discoverer. The Drummond light, then, the instant it was uncovered, elicited a shout of admiration from the whole party, as being something much more brilliant than we had looked for. The light was not only more vivid and conspicuous, but was peculiarly remarkable from its exquisite whiteness. Indeed, there seems no great presumption in comparing its splendour to that of the sun; for I am not sure that the eye would be able to look at a disc of such light if its diameter were made to subtend half a degree."

It is a curious fact that this light was the primary cause which led Drummond to abandon science and to adopt a political career for the remainder of his life. The change arose thus: Lord Brougham had heard much of the discovery, and expressed a wish to see it. A mutual friend, Mr. Ker, a Chancery barrister, asked them both to dinner, and requested Drummond to exhibit the light in his greenhouse. This was done. Brougham was much interested, and formed a friendship with Drummond, which soon led to his being offered political employment. McLennan, in his Memoir of Drummond, thus refers to this dinner, and its results:—

"From the meeting with Lord Brougham may be dated the end of his scientific career. It did not actually end then, but his intervals of study were few from this till the time of his final absorption in politics. Lieutenant Drummond, Fellow of the Royal Astronomical Society, reputed inventor of the measuring bars, and fresh from Ireland, after accomplishing one of the most delicate and interesting geodetical operations ever performed, now astonishing the town with his brilliant light, as he had years before astonished the *savans*, was a man of mark to be everywhere received and courted. In manner very modest and gentle, he created none of those jealousies which often prove obstacles to the success of men of parts. And while few, if any, made him the subject of detraction, the many who knew him well and loved him, spread his credit for general accomplishments as remarkable as the particular achievements on which rested his public reputation. An upright, able, and indefatigable public servant, his character as a private gentleman was wholly unblemished. Such was Thomas Drummond, and such was his reputation when, in the thirty-third year of his age, he began to make the acquaintance of political personages, and stood on the threshold of political life."

Although his career as a scientific investigator was now brought to a close, the first duty to which he was called in his new career, was connected with his work as a Survey officer. He was

appointed head of a Commission to determine the boundaries of boroughs, under the Reform Bill about to be passed through Parliament. Lord Melbourne's letter, offering him the post, was dated August 8th, 1831. It was no slight compliment to place a young Engineer officer, holding the rank of Lieutenant, at the head of a Commission of twenty-four members, many of whom were men of considerable position and weight. Drummond was, however, fully equal to the task, and on February 10th, 1832, the final report was sent in a few days before the Boundaries Bill was introduced into the House of Commons.

A curious mathematical discussion and dispute arose on the manner in which Drummond treated the question. It had been decided by the Government that the boroughs to be scheduled for disfranchisement or diminution of representation should be selected by a calculation based on the number of houses and the assessed taxes which they severally paid proportionately to those numbers.

Drummond worked the principle thus :—

"1st. Take the average number of houses contained in the boroughs to be arranged, divide the number of houses in each borough by this average number, and a series of numbers will be obtained, denoting the relative importance of the different boroughs with respect to houses.

"2nd. Take the average amount of the assessed taxes paid by the same boroughs, and proceed in the same manner as described with respect to the houses ; a series of numbers will result showing the relative importance of the different boroughs with respect to assessed taxes.

"3rd. Add together the numbers in these two lists, which relate to the same boroughs, and a series of numbers will be produced, denoting the relative importance of the different boroughs, with respect to houses and assessed taxes combined."

The controversy which raged on this subject arose on the point as to whether the numbers should be added together, as proposed by Drummond, or multiplied, some even urging that they should be first multiplied, and then the square root extracted. When the debate came on in the House of Commons, the attack was led by Mr. (afterwards Baron) Pollock, who had been senior wrangler at Cambridge. This was powerful antagonism, and was supported by others. Fortunately for Drummond, an overwhelming weight of mathematical knowledge was arrayed on his side. It is true Mr. Croker said, "The Government have, I think, taken a blind guide to form a new constitution, for than these returns nothing could be more erroneous," but Lord John Russell was able to defend Drummond by quoting the opinion of Professor Airy, Professor Barlow, Professor Wallace, and Sir John Herschel. Having named these several authorities, he concluded, "I think I have said sufficient to satisfy the House that the principle pursued by

Lieutenant Drummond has not been adopted in ignorance of a science which, on the contrary, he has long studied."

Drummond was triumphant, his principle was adopted, and upon his calculations depended the fate of the numerous boroughs which fell victims to the Reform Bill. On the conclusion of their labours, his fellow Commissioners presented to his mother a portrait of himself, painted by Pickersgill. This portrait now hangs in the Court Room of the Edinburgh University.

The Government offered him a gratuity of £2,000 for his services; but this he declined, receiving nothing beyond his ordinary pay and allowances.

In April, 1833, he accepted, with some reluctance, the post of private secretary to Lord Althorpe, who was Chancellor of the Exchequer. In this position he gained much insight into the inner workings of political life, and it proved an admirable training for the more important post which was offered to him in 1835, viz., that of Under-Secretary of State for Ireland. Meanwhile, in 1834, a pension of £300 a year was bestowed on him. The grounds for this award are thus recorded in the Report of the Select Committee on Pensions in 1838:—

"Lieutenant Drummond was a distinguished officer of the Royal Engineers, whose abilities had been shown not only in the Trigonometrical Survey of Ireland, and the more peculiar branches of his profession, but in the prosecution of various branches of science, in which he has made useful and interesting discoveries. He was employed by the Government of Lord Grey in procuring the statistical information on which the Reform Bill was founded, as well as in determining the boundaries and districts of boroughs. Those services were rendered gratuitously. He was afterwards employed in preparing the Bill for the Better Regulation of Municipal Boroughs. Finally, he was employed from April, 1833, to April, 1834, as private secretary to Lord Althorpe, Chancellor of the Exchequer."

Drummond only drew this pension during a few months. On being appointed Under-Secretary for Ireland, he resigned it. It will not come within the scope of this sketch to enter into any lengthy detail of his labours in Ireland. It was he who remodelled the Dublin police force, which had previously been scandalously inefficient. He also organized the Royal Irish Constabulary on their present footing, and created the Stipendiary Magistracy. Indeed, the whole period of his Irish administration was one long toil for the benefit of the country.

Dr. Madden, in speaking of the three principal figures at that time at the Castle, the Lord-Lieutenant, the Chief Secretary, and the Under-Secretary, alludes to—

"The *savoir faire* of Lord Normanby, the virtue of Lord Morpeth, and

the admirable powers, and not less admirable virtue, of the incomparable Drummond."

Mr. Shiel, also, in one of his speeches at a later date, says :—

"The Under-Secretary was Mr. Drummond, who, not born in Ireland was more than an Irishman in his love of Ireland, and who, at his own and his last request, lies buried in the land for which he died of intellectual toil."

One curious detail, connected with his administration, may be recorded here. In a letter of remonstrance, addressed to the Earl of Donoughmore, he made use of the phrase, "Property has its duties as well as its rights." This was seized upon and became a proverb. Many years afterwards, Mr. Gladstone referred to it in a speech, in which he said:—

"I think it was about thirty years ago, when a gentleman of high character and great ability, employed in the public service in Ireland, created very considerable alarm and apprehension by putting forward in a concise and telling form, what was thought the somewhat revolutionary doctrine that property has its duties as well as its rights." . . . "Mr. Goldwin Smith, indeed, gives the aphorism a place among the few gains to the world which form a set-off to the centuries of Irish misery." . . .

This speech led to an animated dispute, as to the true paternity of the aphorism, but the evidence then produced clearly proved that it was the creation of Drummond's brain.

The main cause of his death was his insatiable appetite for work. Not content with the overwhelming duties of his office, he insisted upon serving on the Commission on proposed Railways for Ireland—a laborious task, which would of itself have been found a sufficient field for the exercise of most men's abilities and industry. His colleagues were Sir John Burgoyne, R.E., Mr. Peter Barlow, and Mr. Richard Griffiths. With them were associated Major H. D. Jones, R.E., as secretary, and Lieutenant Harkness, R.E., who was attached for the purpose of analyzing and condensing statistical information. The labours of this Commission were more than his overworked frame could bear, and he never recovered from its effects.

He was taken ill on Sunday, April 12th, 1839, and on the following Wednesday he died. His last words were, "I die for Ireland." At his funeral the pall was borne by the Lord Chancellor, the Master of the Rolls, Judges Perrin and Ball, Baron Richards, and Major-General Sir John Burgoyne. The entire city went into mourning, and all business was suspended.

"If ever a man died for his country," wrote Lord Spencer to his mother, "he did so, and that country ought not, and I believe

will not be sparing in its expressions of gratitude to his memory." In 1843 a statue was erected in the City Hall, of Dublin, to commemorate his services.

Major-General Sir THOMAS LARCOM, Bart., K.C.B.,

joined the Royal Engineers in 1820. After a short tour of foreign service, he was attached to the Ordnance Survey in Ireland, where he acted as executive officer to Major Colby. In this capacity it was his duty to carry out all the details of that great work. To Larcom belongs the credit of having introduced the system of contouring, which added so much to the value of the Survey. He also utilized the opportunity afforded by the visits of his officers and men to every part of the country to amass a vast amount of valuable information—statistical, archæological, historical, and meteorological—which has since proved of inestimable value. He also acquired an intimate personal knowledge of the country and its inhabitants, with whom he was brought in very close contact. His value was soon perceived, and as the labours of the Survey drew to an end, he was employed on numerous Commissions, especially the Irish Railway Commission, and the Census Commission of 1841. In 1846 he was appointed a Commissioner of Public Works, and was promoted to be Deputy Chairman in 1850. In 1853 he was made Under-Secretary of State for Ireland, then for the first time converted into a permanent instead of a political appointment, and continued in this post for sixteen years, only retiring from ill-health, brought on by incessant exertion and the great responsibility and anxiety attendant on the office.

"If he had been Viceroy for those sixteen years, he could not have been more entirely identified during that time with the government of Ireland. Each of these great officers, Lords St. Germains, Carlisle, Eglinton, Kimberley, and the Duke of Abercorn, Whigs and Tories alike, vied with each other in their recognition of his services. Men like Lord Clarendon and Lord Mayo were his enthusiastic friends; splendid gifts of plate, and flattering addresses were presented on his resignation, and till the infirmities of old age intervened, he was frequently consulted upon Irish affairs by subsequent Governments."*

The importance of the work done by Larcom in the government

* "Edinburgh Review," No. 336, p. 471.

of Ireland, was well and pithily described by Mr. Fitzstephen French, who, in a debate in the House of Commons, once said :—

"Ireland is governed by a Colonel of Engineers. In that Department Carlisle" (The Lord Lieutenant) "does the dancing, Horseman" (The Chief Secretary) "the hunting, and Larcom the work."

And again, in the obituary notice of him in the proceedings of the Royal Society, it is recorded :—

"The exhaustive minutes drawn up by him for successive Governments, many of which furnished the speeches of Ministers and Viceroys, form of themselves a history of the progress of Ireland ; but perhaps the best tribute to his unwearied diligence and great powers of administration, is the saying which grew to be proverbial, not only in Ireland, but beyond it, that whatever the changes of Lord-Lieutenants and Chief Secretaries—and he served with some excellent ones—Ireland was always really governed by Larcom and the Police."

On his retirement from office he was created a Baronet, and an Irish Privy Councillor, having previously been made a civil C.B. in 1858, and a civil K.C.B. in 1860. He died in 1879.

Lieutenant-General Sir WILLIAM J. DENISON, K.C.B., obtained his commission in the Royal Engineers in March, 1826. After the usual course at Chatham he was sent to Canada for the purpose of employment on the construction of the Rideau Canal. The training which he received whilst engaged in this work proved of lasting benefit to him, the portion of the canal which fell to his lot being that near its junction with the river Ottawa. The country at the time was a complete wilderness ; and the experience he gained in contending with great natural difficulties in a newly settled district, partly in constructing a canal, partly in controlling rivers of considerable magnitude, and partly in deepening or altering the levels of the natural lakes, was brought into play with much effect in later years, and in more responsible posts. It was at this time that he made a study of the various Canadian tribes, and laid the results before the Institution of Civil Engineers, for which he received the Telford Medal. He returned to England in 1831, and at the commencement of the year 1833 was selected as the first holder of the post of Instructor in Surveying to the young officers of Engineers at Chatham, which it was intended should in future form a branch of the course at that station, instead of being carried on as

hitherto by the Director of the Ordnance Survey. He continued at this work until 1835, when he was appointed to the Municipal Boundary Commission, after which he was attached to the Survey Department, and was engaged at Greenwich in examining the arc of Ramsden's zenith sector, and comparing the observations made with it with those made by the mural circles of the Royal Observatory. Having completed this duty he passed into the employment of the Admiralty, and was placed in charge of Engineering work at Woolwich Dockyard, under Captain Brandreth, R.E., who was Director of Admiralty Works. He remained in that Department for nine years, having in the interim been promoted from Woolwich to Portsmouth. It was during this period that he projected and became the first Editor of the "Professional Papers of the Royal Engineers," the first eight volumes being published by him. On resigning the editorship Captain Denison was presented with a testimonial of plate by his brother-officers "as a token of grateful remembrance; that to him alone they are indebted for having originated the diffusion of individual experience by means of professional papers." In June, 1846, Captain Denison was appointed Lieutenant-Governor of Van Dieman's Land, and on leaving Admiralty employ he received the honour of knighthood, at the request of Lord Auckland, the First Lord.

His work as Governor of Van Dieman's Land, New South Wales, and Madras, together with the brief episode of his acting as Governor-General of India, between the death of Lord Elgin and the arrival of his successor, has been treated of in the Chapter on Colonial Work. In after years he wrote and published an interesting work in two volumes detailing his experiences, under the title of "Varieties of Viceregal Life." On his return to England, in 1866, he came back to the Corps, having been seconded for upwards of twelve years. The Commander-in-Chief offered Sir William Denison the post of Commanding Royal Engineer at Portsmouth, and he promptly accepted it. The Inspector-General of Fortifications, however, interfered to prevent the appointment taking place, on the ground that it was not right to employ him in such a post after the high positions he had held. On this occasion Sir William wrote a long letter defending his acceptance of the command offered to him, in which the following interesting passages occur:—

"I have always had a strong Corps feeling, and have ever considered my position as an officer of Engineers an honourable distinction. I have done my best to qualify myself for the various duties which, as an officer of Engineers, I might be called upon to perform, and I have striven to induce my brother-officers to take the same view as myself of the very varied character of their duties." . . . . "I never looked

upon the appointments I held as permanent." . . . . "I have always looked forward to the time when I could rejoin my Corps." . . . . "His Royal Highness is aware that in 1865, when the question was put to me, whether I intended to resign my commission, I distinctly stated that such was not my intention, and that I held myself in readiness to obey any orders I might receive from H.R.H. I did not then, neither do I now, think, that on re-assuming my position as a Colonel of Engineers, after having acted as a Governor or Governor-General, I have in any way lost caste, or that in performing the duties incidental to an officer of my rank and standing, I can be considered to be doing anything derogatory to myself." . . . . "My opinion is, that in returning as a matter of course to my ordinary duties in the Corps, I have but acted in accordance to a sense of duty, and as I should wish to see my brother-officers do." . . . . "Such being my feelings I, when asked by the D. A. Genl. whether I would accept the command at Portsmouth, replied at once in the affirmative; indeed, I could not act otherwise, and I trust that H.R.H. will admit, that under the circumstances, no option was left to me, and will appreciate my wish to resume my military duties."

It was, however, a strange incident that a man who had acted as Governor-General of India should have been offered, and should have accepted, the post of Commanding Royal Engineer at Portsmouth, only to be rivalled by that which occurred a few years after, when the man who had commanded the Ever Victorious Army in China, with such brilliant success, was also offered, and accepted, the far lower position of Commanding Royal Engineer at Gravesend. The Corps may well be proud of having had in its ranks men whose love for their service led them to such sacrifice of what would generally be considered their dignity.

Although Sir William Denison was not permitted to accept this command, he was not left without occupation. He was appointed Chairman of a Royal Commission for the prevention of pollution of rivers, a post which he held till the end of his life. He also interested himself warmly on the subjects of emigration and colonization, and but a few weeks before his death he gave two lectures on the subject, in Edinburgh. Throughout his career as a Governor, he kept up intimate relations with his brother-officers, especially with Colonel (afterwards Sir Henry) Harness, many of his letters to whom are most interesting, and mark well the earnest character of the man. Here is one written when Colonel Harness had been appointed Deputy-Master of the Mint, in 1850:—

"I can quite appreciate the difficulty and the unpleasant nature of the undertaking, in which you are engaged. To cleanse an old office, and to get rid of the jobbing and trickery which has been the produce of years, is a task for Hercules, it can only be done effectually when the reformer

is all-powerful himself, or when he is thoroughly backed up by the head of the Government. Now, to expect either of these requires much faith, more indeed than is reasonable. . . . I do not on that account bid you stay your hand, God forbid. I bid you go on honestly and steadily, doing your utmost to press upon the Government the essential character of the reforms you wish to introduce, and caring nothing for the clamour raised by those who consider that they have a vested interest in the abuses which they connive at. . . . I would advise you, however, to record upon paper the whole extent of your views. Do not allow them to be cut down or carved away bit by bit; if you are not to carry them out as a whole, let the blame rest upon those who have not allowed the reform to be effectual."

And again, he wrote a year later, to Harness:—

"I have not heard what your success has been in purifying your Augean stable; you had, I know much to struggle against. I am pretty well aware of the abuses generated in an establishment not closely looked after, where much trust must be placed in the hands of subordinate departments. In this, I dare say, the Admiralty was but a type of the Mint. Let me know, however, what you are about, and give me some idea of the process of assaying gold, &c. This is, as you may suppose, a subject of some interest to us out here. I have been making experiments for the purpose of ascertaining whether the specific gravity of gold may not lead to a close approximation to its value. I do not, of course, put this mode of obtaining the value of alloys of gold in competition with that of actual analysis, but I think my experiments shew that as a means of guiding merchants in their purchase of gold, it may fairly be depended on. . . . Now for a little Engineering question. We have a reef at the mouth of the river Tamar, upon which two vessels have been lost. It is a patch of rock about three-quarters of a mile in length, but very narrow; at one end the rock rises about seven feet above low-water mark. The question is, how to erect a beacon upon the rock, our means and appliances being very limited. The patch above water is not more than seventeen feet in diameter, and the rock rises in sharp pinnacles with deep hollows between them. My idea is that an iron cylinder ten feet or thereabouts in diameter, cast in sections and bolted together, might be placed on the rock and filled with large, rough blocks of stone, cemented together with a concrete compound of Roman cement and small broken stones. A cylinder once fixed, another might be bolted to the top of it and filled in like manner, the whole being thus raised about ten or twelve feet above high water. The staff to carry the beacon might be built into the upper cylinder and braced to its circumference. . . . . I am engineering in a large way, draining swamps, building bridges, &c., and I feel that my education makes me specially useful as a Governor in a colony like this, where this description of education is not common."

Whilst Governor of Madras, Denison visited Seringapatam,

and gave, in a letter to Harness, the following account of what he saw :—

"Yesterday, on my way back to Bangalore, I stopped at Seringapatam, and went to look at the breach through which we forced our way into the fort or citadel." (Here follows a description of the fort.) "The spot selected for the breach was a badly-flanked face of the bastion, at the salient angle of the work, the scarp was of hard stone for about a height of twelve feet; above that it was of brick, but this brick was carried back for a thickness of 18 or 20 feet. . . . . The effect of the breaching battery was first to beat down the wall of the *fausse braye*, and to expose the whole of the brick and stone work of the scarp. The fire was then directed upon the brick portions of the revetment, and enough was soon brought down to make a steep slope up to the top of the stone portion of the scarp, but the thickness of the brickwork, and its quality, which is excellent, made it impossible, at the distance of the battery, to cut through the scarp, and the breach was in fact a slope of rubbish for a height of twelve feet, and then a broken face of a brick wall, not quite vertical, but nearly so. The breach was left just as it was, with the single exception that the rubbish at the base had been cleared away. I got down by stepping from one projecting brick to another, but to get up again would have been a very difficult matter had there been resolute men at top. The truth, however, is that the men were natives, and the columns of attack which forded the river in face of the fire of the whole front, had shaken their self-confidence. . . . . I have a strong conviction that Tippoo had intended to lead a body of troops by a sally port some 200 yards from the breach, to attack the storming party in flank, and that the detachment which had moved down the *fausse braye*, finding the sally port open, had forced its way in, Tippoo was wounded there, and was killed some 100 yards in rear. The look of the breach has strengthened my opinion of the advantages of a revetment such as I wrote to you about some time ago, namely, a thin skin of a scarp wall, with counterforts 18 or 20 feet in length, and within 18 inches of each other, in fact a revetment *en décharge;* and if the spaces between the counterforts were filled in with concrete, it would be right difficult to form a breach."

One more letter may be quoted, showing his interest in horses. He was writing to an unnamed correspondent on the subject of the operations of the Government stud depôt at Koruntadha, of which he greatly disapproved :—

"The Arab stallion, which stands not more than 14½ hands high, when put to a good Australian or English mare becomes the sire of a fine animal, with many of the good qualities of both parents. It has the clean sloping shoulders of the Australian, and stands from 15½ to 16 hands high; it has the good head of the Arab; the good hard bones and hoops of the sire; is well ribbed up, and has a good hind-quarter. I have had, as you know, many specimens of these in my possession, both in Australia and India, and I never had reason to complain of one

of them; they were up to my weight, which is no trifle; they carried me well through and over everything, and I ride hard."

The general character of the man may be fairly judged by the letters from which these quotations have been taken. They show him to have been shrewd and observant, nothing being too small to attract his attention, and ever ready to deduce conclusions from what passed under his notice. His career was a varied one, and its success was principally due to the quality of earnestness which he brought to bear equally upon every question, great or small.

Field-Marshal Lord NAPIER OF MAGDALA, G.C.B., G.C.S.I.,

joined the Bengal Engineers in 1826. He became a First Lieutenant a few months later, owing to an augmentation of the Corps. After the usual residence at the Royal Engineer Establishment at Chatham, he proceeded to India, where he landed in November, 1828. In 1831 he was selected for service in the Irrigation Department.

"Indefatigable at work he was soon conspicuous for the devotion to his duty, which has been the characteristic of his life, and this early brought him to notice, and led to his being selected for the then comparatively new field of Indian irrigation. Placed on the Great Eastern Jumna Canal, he became the pupil and the friend of Proby Cautley, who was soon to develop a new and brilliant school of engineering.—("Times of India," April 10th, 1876.)

Here and afterwards at Shamli, Napier learnt those practical lessons of construction which were so valuable to him in later days. He continued his service in the Jumna Canal branch for five years, when a severe attack of illness, brought on by exposure and overwork, compelled him to take leave of absence. This was extended for a period of three years, during which time he devoted himself to the inspection and study of the various public works then in progress in England, and also of the great industrial establishments of Belgium. Lieutenant Napier returned to India in 1838, and was ordered to Darjeeling, where a new settlement was to be established. Here again he was engaged in very arduous work, and had to endure considerable hardships in a district which was utterly undeveloped.

"Primæval forests containing an undergrowth of all but impenetrable cane jungle, within which the rays of the sun barely made their way, covered what is now the site of one of our most favourite sanitaria, and

of the most successful tea plantations, and rendered difficult the progress of Napier through the country, and much more the carrying on of engineering operations. Nevertheless, all difficulties gave way rapidly before the energy of the now experienced and skilful engineer, and though beset with many obstacles by desertion among his labourers, who were terrified at the gloomy darkness of the jungle and the sickness amongst their comrades, important results were soon secured. Roads were opened, sites cleared, and a foundation laid for the settlement." —(*Ibid.*)

It was whilst in this employment that he completed the organization of the local Corps of Sebundy Sappers, which had been originally established by Gilmore. In the scarcity of ordinary labourers these men were found most useful in carrying out the works rendered necessary for the infant settlement. In an article which he contributed to Yule's "Glossary of Anglo-Indian Words," under the heading of Sebundy Sappers, he says :—

"The Sebundy Sappers were a local corps designed to furnish a body of labourers fit for mountain work. They were armed, and expected to fight when necessary. After a time, when labour became plentiful, the Sebundy Sappers were disbanded."

Napier was promoted Captain in 1841, and in the following year appointed Executive Engineer of the Sirkind Division, where he was engaged in the construction of a new cantonment, near Umballa, to replace that at Kurnaal, which it was intended to abandon, owing to the mortality amongst the troops. He remained at this post until the outbreak of the first Sikh war at the end of 1845. He was summoned for service in this campaign, and joined the army on the morning when the battle of Moodki was fought. In this, as well as at that of Ferozeshah on December 21st, he acted as Chief Engineer, and at the latter was severely wounded. He had two horses shot under him in these engagements.

By the time Sobraon was fought (February 10th, 1846) three senior Engineers had joined the army, and Napier's position had subsided into that of Brigade-Major to the Corps. For his services in the campaign he was mentioned in despatches, and given the brevet of Major.

Early in May a force was detailed, under the command of Brigadier-General Wheeler, for the reduction of the mountain fortress of Kote Kangra. Colonel H. Smith had been appointed Chief Engineer, but was not able to undertake the duty from illness. Major Napier was therefore selected to fill the post. In this operation the principal difficulty was the construction of a road for the transit of the artillery (thirty-three guns and

mortars). The labour necessary to carry out this work, which at any time would have been one of extreme difficulty, was greatly enhanced by the torrents of rain which fell almost unceasingly. Napier, however, persevered, and being well supported by his subordinates, achieved the task which was by many considered an impossibility. The presence of the artillery, which the garrison of the fort had not expected, led them to capitulate without a blow :—

"This was no small achievement : the crossing of the rapid Beas with but little means, and transporting of the material over hills and torrents, one of which in one march alone had to be crossed twenty-four times. Wheeler himself claimed but little share in the achievement, but expressed his gratitude to Napier and those officers and men of the Sappers to whose unremitting labours he owed the success of the undertaking."—("Times of India.")

On the establishment of the Lahore Regency, Major Napier was appointed Engineer to the Durbar. In this position he commenced the design of that grand scheme of public works, which he afterwards so successfully completed. Whilst thus engaged the second Sikh war broke out, after the murder of Van Agnew and Anderson. The brilliant exploits of Lieutenant Herbert Edwardes in this crisis are a matter of history, and when he had driven the revolted Sikh army behind the walls of Mooltan he wrote :—

"I would suggest that the siege be commenced at once. We are enough of us in all conscience. All we require is a few heavy guns, a mortar battery, as many sappers and miners as you can spare, and Major Napier to plan our operations."—(Edwardes's "Year on the Punjab Frontier," 1851, vol. ii. p. 485.)

This appeal was for a long time unanswered. The military authorities considered that it would be

"impolitic to entrust British ordnance to irregular levies," and that "a British army must accompany British guns. The equipment of this, the collection of carriage, commissariat, &c., prevented the siege from being opened till September."—(*Ibid.*)

The result of the delay was that Moolraj had ample time to prepare for the coming storm.

When assistance was sent, it consisted of a Division under Major-General Whish, to which Napier was attached as Chief Engineer. The first portion of the siege operations, which commenced early in September, met with no success, and ended in the besiegers being themselves attacked. On this occasion Van Cortland's Sikh Horse Artillery suffered considerably :—

"Napier, to encourage the gunners, laid and helped to work the guns himself."—("Times of India.")

Shortly afterwards Napier was wounded in an attack on the suburbs, and was disabled for some weeks. During this interval the siege was suspended awaiting reinforcements, as Shere Sing had gone over to the enemy with 10,000 men. The army fell back and encamped beyond the canal on the west of Mooltan.

The Sikhs, after a considerable period of inactivity, assumed the offensive, which rendered it necessary to take active measures against them. A flank attack was made, supported by a direct front movement, in which, as Edwardes wrote—

"a mere manœuvre of fine soldiership turned a large army out of a strong intrenchment, and routed them with the loss of five guns before they even understood the attack. It was the triumph of discipline over an irregular army."

This victory prevented any further hostile manifestations, and the army remained undisturbed in its camp until the arrival of reinforcements in the form of a Bombay Division. With these troops, Colonel Cheape, the Chief Engineer of the Punjab, arrived and took command of the Engineering operations. As Edwardes wrote—

"Major Napier, therefore, lost the honour of directing the second siege; but in zeal and gallantry in its prosecution he continued . . . . second to none."

With the strong force now in front of the city Cheape found no difficulty in prosecuting the siege. The suburbs were cleared, breaching batteries established, and on the very day when the assault had been ordered the enemy capitulated and the fortress was surrendered. On the conclusion of the operations, Whish's Division marched to join Lord Gough, and Napier accompanied it. He was consequently present at the battle of Goojerat, on February 21st, 1849. For his services at the siege and in this battle he received the brevet of Lieutenant-Colonel.

On the annexation of the Punjab he was appointed Civil Engineer to the Board of Administration, a post which he held seven years. During this time he initiated and carried out that great system of public works which has done so much to develop the resources of that magnificent province, and to render it one of the most loyal of all our Indian possessions. With regard to his services during these eventful seven years, Lord Dalhousie wrote as follows, on the occasion of his relinquishing the post, in a despatch addressed to the Chief Commissioner of the Punjab, dated October 25th, 1854:—

"Such results could not have been obtained without the presence of abilities and exertions, such as call for the grateful recognition of the Government."

Then alluding to Napier's Engineering Staff, he writes :—

"To all of the Officers, Colonel Napier, the Chief Engineer, has done full justice. But to Colonel Napier himself the Governor-General in Council is anxious to render the honour that is due. For several years the Governor-General has been in close relations of business with Colonel Napier, and has seen and marked the deep devotion with which he has laboured in the discharge of the many and various duties of his important office. The report before Government shews his success in one branch only of the great Department with whose conduct he is charged, but it has been equally conspicuous in all. Whatever may be the credit due to those whose efforts have been directed to the physical improvement of the Punjab, a principal share of that credit is justly due to Lieut.-Colonel Napier, whose professional abilities, unwearied industry, and judicious guidance have contributed so largely to the material result which has happily been attained."

Several minor military services were rendered by Napier during this interval of time. In December, 1852, he joined Colonel Mackeson's expedition against the tribes of the Black Mountain. In this he commanded the right column. In reporting the operations, Colonel Mackeson wrote :—

" My obligations to Colonel Napier are greater than I can express, for the steady and skilful manner in which he brought his column through many difficulties of ground and determined opposition by the enemy."

In November, 1853, Lieutenant-Colonel Napier took part in the expedition, under Colonel S. B. Boileau, against the Jowaki Afridis of the Bori Valley, on which occasion the Chief Commissioner (John Lawrence) reported to the Governor-General—

" that the success of the expedition was mainly due to the exertions and ability of Lieut.-Colonel Napier, the Chief Engineer of the Punjab, and Major Edwardes."

In the autumn of 1856 Napier went home on leave, but was already on his way back to India when the news of the Mutiny met him at Aden.

He was appointed Chief Engineer of Bengal, but shortly after was gazetted as Military Secretary and Chief of the Adjutant-General's Department to Sir James Outram, whom he immediately joined on his way to Allahabad. He took part in the three actions fought by the combined force of Outram and Havelock, on the way to Lucknow, and entered with them.

The defence of Lucknow has already been described in a former portion of this work, but the following extract from Sir James Outram's despatch of November 25th, 1857, refers specially to Napier :—

" But skilful and courageous as have been the engineering operations,

and glorious the behaviour of the troops, their success has been in no small degree promoted by the incessant and self-denying devotion of Colonel Napier, who has never been many hours absent by day or night from any one of the points of operation—whose valuable advice has ever been readily tendered and gratefully accepted by the executive officers—whose earnestness and kindly cordiality have stimulated and encouraged all ranks and grades amidst their harassing difficulties and dangerous labours."

It must be remembered that at this time the position of Colonel Napier, with regard to his brother Engineers, was somewhat peculiar. He was the senior officer of that branch of the service present; but being on Staff employment, he was not the Chief Engineer, that post being held by Captain Crommelin. This explains Outram's allusion in the above extract.

On November 17th the second Relief of Lucknow was effected, and on that day, when accompanying Outram and Havelock to meet Sir Colin Campbell, Napier was severely wounded. He went with the Commander-in-Chief to Cawnpore, where he was placed in hospital. He received the C.B. for his services at the defence of Lucknow.

It was at this time that the outline of the proposed operations for the reduction of Lucknow was drawn up. In a memorandum for Lord Canning, dated December 22nd, 1857, Sir Colin writes:—

"Colonel Napier has given the deliberate opinion, in which I coincide as regards numbers, that 20,000 men are necessary for the first operation of subduing the city. That having been performed, it will be necessary to leave a garrison in occupation, consisting of at least 10,000 men, viz., 6,000 in the city, and 4,000 in a chain of posts to the Cawnpore roads, until the whole province shall have been conquered, and the rebels driven out of their last stronghold."—("Life of Lord Clyde," vol. ii. p. 68.)

Early in January, 1858, Napier returned to his post as Chief of the Staff to Sir James Outram, at the Alumbagh, where that general had been left with a force to hold the ground pending the return of Sir Colin. Whilst there he soon formed the opinion that the attack should be made on the east side, accompanied by a flank movement on the north, across the river, which would take the enemy's line in reverse. He therefore devoted the interval between his arrival at the Alumbagh, and that of Sir Colin with his force, to a careful inspection of the ground on both sides of the river. Some time afterwards he gave the following reasons for his views in the "Royal Engineer Professional Papers," vol. x.:—

"The east side offered, first, the smallest front, and was therefore the

more easily enveloped by our attack ; secondly, ground for planting our artillery, which was wanting on the West side ; thirdly, it gave also the shortest approach to the Kaiser Bagh, a place to which the rebels attached the greatest importance ; more than all, we knew the East side, and were little acquainted with the West."

Sir Colin summoned Napier back to Cawnpore, where everything was decided in accordance with his views, and on the 10th he was appointed to the command of the Engineer Brigade. The operations involved in the capture of Lucknow have been described in Part I., Chapter XX.

Within less than a week after the recovery of the city, Brigadier-General Napier submitted to the Commander-in-Chief memoranda of the defensive measures by which he considered the control of Lucknow could be secured with a comparatively small garrison. The chief difficulties to be contended with were the absence of any very prominent features of ground, the vast extent of the city, and the impediments to circulation. The principal points in his project were the creation of three strong fortified posts along the north or river side of Lucknow, and the laying open its almost impenetrable labyrinths by the construction of great roads.

"'These works,' said Lord Clyde, 'set free and at my disposal some 12,000 men.'"—("Times of India.")

By the middle of May Napier had finished his share of the duty and proceeded to Allahabad. He almost immediately afterwards received instructions to take over the command of the Gwalior force from Sir Hugh Rose, who had been invalided, as "worn out with fatigue and successive sunstrokes."—("Record of Services of Lord Strathnairn," p. 51.)

Just at this moment the beaten army of Tantia Topee, and the Ranee of Jhansi marched down on Gwalior, fought and defeated Sindhia, and took possession of the city.

"In short, the rebels, who had fled in the most disorderly flight and helpless state, from Calpee, were now unexpectedly set up with abundance of money, a capital park of artillery, plenty of material of war, and Sindhia's army, as their allies, the best organized and drilled of all the native levies."—(*Ibid.*, p. 52.)

This news reached Sir Hugh Rose just after his leave had been granted, and he at once telegraphed to Lord Canning that he should not avail himself of it, but march his force on Gwalior. Napier on this—

"with that generosity that always characterized him, told Lord Canning that he would be delighted to serve as second in command." —(*Ibid.*)

He therefore joined Sir Hugh Rose at Bahudurpore early on the morning of June 16th, and took over the command of the Second Brigade, of which, however, only a small portion was present, most of it having been left at Calpee. While the men breakfasted a reconnaissance was made, and Rose determined on an immediate attack of the cantonments of Morar, distant about four or five miles. The advance was made in two lines, the first of which was under the command of Sir Hugh—

"The second line under Brigr.-Genl. Napier was placed in échelon on his left, the left 'refused,' as the Major-General had heard that the ravines on the left were full of ambuscaded troops, and this formation would enable him rapidly to wheel the whole force to the left if necessary. . . . As the troops advanced the enemy in the ravines were forced to show themselves by Brigr.-Genl. Napier, and a sharp action took place between them and the 71st who, as usual, behaved admirably, completely beating the enemy with great loss." To General Napier were due "Sir Hugh Rose's warmest thanks for his skilful management."—(Strathnairn Record, p. 53.)

On June 18th Sir Hugh Rose quitted Morar for Gwalior, leaving Napier to guard that cantonment, and to pursue the enemy on receipt of orders; his Brigade having been completed by the arrival of the Calpee garrison on the 17th. Gwalior was captured on the 19th, and instructions were then sent to Napier to carry out the pursuit "as far and as closely as he could." He at once assembled his force and started in pursuit of Tantia Topee, who was stated to have with him 12,000 men and 25 guns, sending a message to Sir Hugh Rose that he should attack "whenever and wherever he came up with him." Following steadily on the enemy's line of march Napier reached the town of Samowli, about twenty-four miles distant, soon after nightfall. They had halted for supplies, and had just moved off. Napier, knowing that he could do nothing with them in the dark, remained where he was, and gave his men some hours' rest, continuing his pursuit early in the morning. Sir Hugh Rose had sent a reinforcement to Napier fearing that his strength was not sufficient to cope with the army of Tantia Topee, and this arrived at Samowli just as Napier was preparing to start. As they had made a forced march and required rest he left them to follow later on. Consequently they took no part in the impending action.

At dawn he with his advance guard came up to a short range of low sand-hills bordering the plain of Jowra Alipore. In this plain the enemy were drawn up after their night's march, utterly ignorant of his approach. He waited until his force had assembled, and then forming them behind the ridge, prepared to charge as soon as his artillery had had time to sweep the lines of the rebels. The dis-

proportion between the rival armies was enormous, and it seemed almost a hopeless task to assail such superior forces, but Napier knew well that his only chance of success was in headlong dash. At the first symptom of wavering on the part of the enemy from the effects of his guns he hurled his troops upon their lines, and in a few minutes drove them from their position. The triumph was complete, they abandoned their camp and train, and took to headlong flight.

Napier's cavalry succeeded in capturing every one of the guns which Tantia Topee had with him, and after continuing the pursuit as long as practicable, and until the fugitives had become utterly disorganized, they returned to camp. Napier marched triumphantly back to Morar, bringing with him the artillery he had recovered. Thus terminated what Sir Colin Campbell, in a letter to the Duke of Cambridge, called Napier's "brilliant sequel."* On June 29th he assumed the command of the Gwalior Division, Sir Hugh Rose having taken his leave.

When the news of the result of the Central Indian Campaign reached England General Napier received the thanks of Parliament and the honour of the K.C.B.

The country was now clear of any large organized force of rebels, but being full of minor posts, small parties continued to give trouble, and as it was very necessary to prevent their collecting into more formidable bodies, Napier dealt with these cases as they arose by flying columns. Meantime rest and shelter had become imperatively necessary for the troops, exhausted by severe and harassing service at the worst season of the year. Under his personal supervision every effort was made to restore, clean, and drain the wrecked cantonment of Morar, and accommodation for 200 Europeans was provided in the fortress of Gwalior, to which he also transferred his ammunition and supplies, so as to be free to take the field unencumbered should the enemy re-appear.

Affairs were in this condition when Rajah Maun Singh, of Nurwar, surprised the strongly-fortified town of Powrie, situated eighteen miles west of Sipree, and eighty-three miles south-west of Gwalior, which he garrisoned with nearly 4,000 men. Brigadier-General Smith, commanding at Sipree, advanced towards Powrie, but found himself unable to capture the place, and applied to Gwalior for reinforcements. Napier started at once with a small body of men and some artillery, and by forced marches reached Smith on August 19th. Operations against Powrie commenced on the following day. Whilst his breaching batteries were being

* "Life of Lord Clyde," vol. ii. p. 262.

constructed, he made some mortars he had brought with him play steadily on the place, after which he opened fire with his guns. The enemy did not wait to be assaulted, but abandoning the fort by night fled southwards. Napier immediately despatched a column in pursuit, which inflicted great loss on the retreating enemy.

In December a new antagonist appeared in the person of Feroze Shah, who, having been driven from Rohilkund and Oude by the restoration of order, decided as a last chance to join his force to that of Tantia Topee. Sir Robert Napier had thrown out three small columns to intersect his probable route, and held a fourth in readiness to act under his own command. On December 12th news reached him of Feroze Shah's approach. The opinion at Gwalior was that he would either make for that city or for the district north-west of it. But Napier thought differently, and decided that he would pass through the jungles of the Sindh river, south-west of Gwalior. Accordingly at 2 p.m. that day he marched with a small column for Dubbra on the Jhansi road. That night he halted at Antri, where at 2 a.m.,

"he was roused by an express message from the Political Agent at Gwalior, Macpherson, to the effect that the information he had received led him to believe that the rebels would pass by Gohud, north of Gwalior."

Therefore, instead of pushing on to Dubbra at once, as planned, Napier despatched messengers for information. At 10 a.m. the answer came that the rebels were burning the dawk bungalow at Dubbra.

"The express from Gwalior had just come in time to baffle the accurate conceptions of Napier's brain, for had it not arrived he would have caught them at the very spot he had selected."—(Malleson, vol. iii. pp. 360, 361.)

Napier at once hastened forward, and at Bitowar, on the 14th, learnt that Feroze Shah was only nine miles ahead. Continuing his pursuit through Narwar, he there dropped all his artillery and infantry, except thirty-eight men of the 71st Highlanders, whom he mounted on baggage camels. He then proceeded with the utmost speed through the jungle, and struck the enemy's track on the morning of December 17th at Rannode, where he learnt that the rebels were hourly expected.

"His divination that they would make their way through the jungles of the Sindh river had proved to be perfectly accurate. Feroze Shah . . . . had marched on a line almost parallel to that followed by the English leader, and it was only" a little deviation he had made to sack Rannode, "which had saved him from attack the previous day. Full of confidence, and utterly ignorant of the arrival of the English," Feroze Shah approached, "his army . . . . extended on a front of nearly a mile."—(Malleson, vol. iii. p. 362.)

Meanwhile Sir Robert had hastily placed his sick and baggage within Rannode, and formed his small body of cavalry under cover of some trees, with the mounted Highlanders on the flanks. The force actually engaged consisted only of about 200 cavalry and the 38th Highlanders on camels; but no sooner did the enemy appear than the little body dashed at them, and speedily put them to rout. The loss of the rebels was estimated at 450 killed, of whom 150 were left dead on the field, and 300 killed in the pursuit. The British loss was only sixteen wounded.

At the end of January, 1859, Tantia Topee, beaten in the North-West, fled southwards to the Parone jungles, undiscovered by the British. Sir Robert Napier had already recognized "this tract of country as one likely to give trouble." It consisted of

"a belt of hill and jungle, little known, flanked at each end by a hill fort, with plenty of guns, and garrisons the reverse of friendly towards the English. . . . . with a population yielding members for any plundering occasion."—(Napier's Despatch, March 27th, 1859.)

This tract he determined to control, by destroying the principal fort, and clearing roads through the jungle. The fort of Parone having been destroyed by the Royal Engineers, he caused clearings to be cut in different directions, through the hills and glens, past the most notorious haunts of the rebels. This policy proved quite successful, and on April 4th Napier was able to report to Lord Clyde :—

"Maun Singh has surrendered just as his last retreats were laid open by the road. . . . . Since the days of General Wade the efficacy of roads so applied has not diminished."

The surrender of Maun Singh led to a still more important result, namely, the capture of Tantia Topee, whose presence in the jungle had hitherto been unsuspected. This was followed by the collapse of the rebellion in Central India.

Within a month Napier was recalled to Gwalior, by news of the excitement caused there, as elsewhere among the Company's European troops, owing to their summary transfer to the Crown. He took such steps as seemed necessary for the maintenance of order, and the combined kindness and firmness of Lord Clyde and himself calmed the discontent.

He was before long called on to renew his active service, being appointed in January, 1860, to take command of the Second Division in the Expeditionary force about to proceed to China. The whole of the arrangements attending the provision of the necessary equipment, and the preparation of the transports to convey the army, were entrusted to Napier, and he was for upwards of two months busily engaged in this laborious and

anxious work. At length all was ready, and the troops were embarked. Hong Kong was reached in the middle of April, and after a further delay of two months Napier started, on June 11th, in H.M.S. *Imperieuse*, for Tahlien Bay, which had been selected as the *rendezvous*. Through the non-arrival of the Ambassadors, who were to accompany the troops, the expedition did not sail for the Peiho till July 26th.

The First Division disembarked between August 1st and 3rd, and seized on the town of Pehtang. The Second Division was landed between August 5th and 7th. In Chapter XXI., Part I., the incidents of this campaign have been dealt with as far as the strictly Engineer portion of the operation was concerned. The movements of Napier's Division, which only affect this history from the fact that he was the commander, have been reserved to be touched on here.

The whole country between Pehtang and the Forts, as well as the surrounding district, was an extensive mass of mud flat, very tenacious, and, except in certain places, utterly impassable for troops. It was intersected by numerous canals, and the ordinary traffic was carried on by means of raised causeways. Reconnaissances were made by Napier, Wolseley, and others, by which it was ascertained that the village of Sin-ho, which was occupied in force by the enemy, could be approached in flank by a circuitous route, where the mud flat was not utterly impracticable. It was therefore ordered that Napier's Division should adopt this line, whilst the First Division and the French should proceed by the causeway which led direct from Pehtang to Sin-ho. This method of advance, although so difficult that it took Napier's force six hours to cover a distance of four miles, answered the purpose for which it had been designed. The Tartars found themselves taken in flank, and after a brief resistance abandoned the village of Sin-ho and an intrenchment which they had thrown up across the causeway:—

"Napier's Infantry were speedily deployed, his Cavalry let loose, and Artillery kept going, and though the heavy ground was rendered more difficult for our Cavalry, by ditches broad and deep, whose passages were known to the enemy alone, yet within a quarter of an hour of their advance the Tartar force was everywhere in retreat."—(Greathed's "China War of 1860," "Blackwood's Mag.")

The ground having been thus cleared, the allies were in a position to proceed with the attack on the forts. The French had desired that operations should commence on the south side; but, as already mentioned in the history of this campaign, Sir Hope Grant was firm in his resolve to seize on the North Forts. There is no doubt that in this matter he was supported by Napier,

who was strongly of the same opinion. Fortunately, the French acceded, though most reluctantly, to the views of the British commanders, restricting their demands to the construction of a bridge across the Peiho.

The operations against the North Forts were confided to Napier's Division, and by them carried to a successful issue. It is not to be imagined that an Engineer of such skill and eminence should have refrained from impressing his views upon the Commanding Engineer of the army. Doubtless, in much that was so admirably carried out under the superintendence of Captain Mann, he had the benefit of the advice and assistance of his superior officer. Napier, although at the time in command of a Division, and consequently not on Engineer duty, was a man who knew well how to make his views felt without interfering with the prerogative of the junior officer who was at the head of that branch. The main credit for the success of the assaults on August 21st belongs to him for the way in which he assisted the Engineers in all their preliminary work, and at the critical moment handled his troops. The incidents of that day have been already recorded.

When Sir Hope Grant advanced on Tientsin he left Napier to complete the occupation of the forts, and render their retention secure. When this was accomplished, he and his Division also moved forward on Tientsin, which they reached on September 5th. His share in the remaining operations of the war was most useful, but not requiring any detail. When Sir Hope Grant advanced on Pekin, Napier was left in command at Tientsin, and on him devolved the laborious and important duty of pushing supplies to the front. After the battle of Chang-kia-wan, Sir Hope Grant

"sent an express to summon General Napier with as much as could be spared of the Second Division from Tientsin. The order found them ready to move, and Gen. Napier reached Head-quarters on the 24th, having marched seventy miles in sixty hours, with a supply of ammunition, which was much required."—(Greathed).

He was not in time for the battle of Pa-le-cheaou, which was fought whilst he was on the road. The remaining incidents of this campaign have been detailed. It therefore only remains to say that Sir Robert Napier and his staff embarked for Hong Kong on November 19th, from whence they returned to India. From 1860 to 1865 he occupied the post of Military Member in Council of the Governor-General of India.

"In the administration of Lords Canning, Elgin, and Lawrence, the records testify to his untiring exertions to improve the condition of the British soldier, but more especially to secure for him the benefit of two-

storied barracks with accommodation for families, an increase of accommodation for the troops on the hills, the opening out of communications including the extension of railway lines, the improvement of our defences, and the remodelling of the armament."—("Times of India.")

In 1866 he was appointed Commander-in-Chief of the Bombay army. Here he had an ample field for the work he loved best, the development of schemes for the benefit of the soldiers, and especially those of the native army. Napier was always beloved by his men, and no one more amply deserved that attachment. His every thought and every care was for them, and as head of the Bombay army he gave full scope to his views. The consequence was that when, in the autumn of 1867, it was decided to send troops to Abyssinia and to entrust the command to Napier, he had under his hands a weapon he himself had forged, and on the true temper of which he felt sure he could depend.

For the three months which elapsed between the first intimation to him that he was to undertake the work, and his departure for the seat of war, he devoted himself to personally supervising every detail connected with the service. Nothing was left to chance, nor indeed to others to carry out without his cognizance, and the result proved the ability with which every measure had been adopted throughout:—

"From the outset of this very difficult undertaking, the hands of the commander were strengthened by the implicit confidence which H.R.H. the Duke of Cambridge and the Secretary of State for India were enabled to place in him—a confidence merited by field service of no ordinary distinction, and a career involving a very varied experience."—("Times of India.")

He was allowed to select his own troops, and he naturally chose the men whose organization and disciplinary training had been so much the work of his own hands. With the exception of a single Company of Engineers (the 10th) which came from England, and a small subsidiary force from the Bengal army, all the regiments were of the Bombay establishment. In a minute dated September 5th, 1867, he wrote:—

"It is of some consequence in an expedition of the nature of that in contemplation, which may have to encounter hardship, fatigue, and privation of no ordinary kind, that the troops to be employed should know each other and their commander."

The details of the Abyssinian Expedition have been given in Part I. Chap. XXII., and, as was there shown, fell to a great extent on the Engineers of the force. It was essentially an Engineer campaign, and well was it for its success that it was commanded by a man who was not only a consummate leader but at the same time a highly trained scientific soldier. One point in the undertaking

has not been treated of, and that one was of a character personal to Napier. The difficulty of preventing Theodore from massacring the captives who were in his possession must have proved a source of the keenest anxiety to the commander of the army. The wily savage was shrewd enough to realize the strong card he held in his hand, and he strove to play it to his own advantage. A man of a lower type of character than Napier would probably have temporized in the hope of attaining his object without risk to the unfortunate prisoners, but that was not the view taken by him. He felt that the bold game was the one most likely to be at the same time the safest and the most successful:—

"As a matter of fact the release of the Abyssinian captives was mainly due to the determination of Sir Robert Napier to admit of no conditions with an unconquered savage, other than that of unconditional surrender. The strength of character of the British commander had as much influence on the mind of his enemy as the mysteries of a far-reaching and wonder-working artillery. The savage acknowledged his master, and if he selected to die himself he dared attempt no injury to the captive band, who, seemingly at his mercy, were under the protection of an enemy he had learnt to respect as well as fear."—("Times of India.")

On returning to England at the close of the campaign Napier received an ovation which marked the keen sense of relief felt by the country at the prosperous conclusion of an undertaking which everyone had realized was fraught with extreme danger. Prudence, foresight, and skill had overcome all obstacles, and the gratitude of the people was unbounded. He was thanked by Parliament, and raised to the Peerage under the title of Baron Napier of Magdala.

In the year 1870 he was appointed Commander-in-Chief in India, a post which he held till 1876. In this exalted position he was able to carry out on a still larger scale the reforms and measures of amelioration which he had previously instituted at Bombay. When he left India at the conclusion of his term of office he was greeted with every possible token of regard, and of regret at his departure. A statue by Boehm has since been erected in his honour at Calcutta, on the Maidan, near Prinsep's Ghāt. This was unveiled by Lord Ripon, in 1883.

On arrival home Lord Napier was appointed Governor of Gibraltar, an office which he held until 1882, when he returned once more to England. It is hoped that he may yet be spared for many years to assist his country by the benefit of his advice, and the experience of a long and brilliant career. The highest post in the army, that of a Field Marshal, which had only once before been conferred on an Engineer, has been obtained by him, and he has also received the dignified appointment of Constable of the Tower.

General Sir HENRY DRURY HARNESS, K.C.B.,

entered the Corps in 1827. After a tour of foreign service he was appointed Instructor of Fortification at the Royal Military Academy at Woolwich, from whence he was transferred to the School of Military Engineering as Instructor in Surveying. In 1845 he was offered and accepted the post of Inspector of Welsh Roads, an office created at that time to assist, and in some measure control the county authorities in the re-arrangement of the public roads in Wales, consequent on the change in the system of maintenance from turnpikes to county rates. Many important questions relating to the laying out, construction, and repair of these roads had to be settled, and the manner in which he dealt with them was universally recognized as showing him to be a man of great ability, and much power of organisation. About this time, the subject of dealing with the system of railways, then being rapidly developed, was causing much anxiety at the Board of Trade, and they turned to the Corps of Royal Engineers as the best source from which to obtain men capable of advising them in the matter. A Commission was formed, of which Captain Harness was appointed Secretary. In this position he was thrown in contact with all the leading engineers of the day. In 1850 he was called on to undertake the duty of reforming the Royal Mint. The Master of the Mint was, at that time, a political officer, and Harness, as the Deputy-Master, became the real head of the department. The mechanical operations connected with the production of coin had hitherto been controlled by a body of melters, assayers, and moneyers, who contracted with the Deputy-Master for the execution of the coinage at certain rates. The art of coining was regarded as a "mystery," known only to this confederation of experts, who, besides enjoying from its exercise very considerable emoluments, claimed a vested interest in the appointment of all new-comers. This enabled them to make provision for their friends and relatives without much consideration for the public good. The task allotted to Captain Harness was to convert this close corporation into a simple Government Department, and it was not an easy one. In order to deal successfully with a body of men strenuously opposed to reform, he had, in the first place, to acquire a sufficient knowledge himself of their "mystery;" and further, in case of determined opposition, to be provided with means for carrying on the coinage without their help. Both of these conditions he fulfilled, and for the latter, he held in reserve

a detachment of Sappers, to be called upon if necessary to undertake the mechanical operations of coining. He succeeded, however, in carrying out the desired reform without their aid. Before the business had been completely and satisfactorily arranged, a change was made in the Mastership of the Mint. It was no longer to be looked upon as a political office, but the holder was to have the actual control of the department. Sir John Herschel was appointed to the post, and Harness, who considered that his own claims had been unjustly neglected, resigned his connection with the Mint as soon as he had completed his reforms, although Lord Aberdeen, the Prime Minister, personally solicited him to remain. As regards the service performed by him, Sir John Herschel thus wrote in his report in 1852:—

"I cannot conclude this report without observing that, but for the clear views, ready resource, and indefatigable energy of Capt. Harness, the Deputy-Master, it would scarcely have been practicable to carry out these reforms in the efficient manner in which it has been done."

Captain Harness having resigned his post at the Mint was offered the Governorship of New Zealand. This he declined as unsuited to his tastes, but he accepted the office of Commissioner of Public Works in Ireland, and held it for two years. In 1855 he was brought back to England to become the head of the Fortification branch under the Inspector-General of Fortifications at the War Office, which position he retained during the Crimean War. When the Indian mutiny broke out, he accepted the command of the Royal (as distinguished from the Indian) Engineers, which was to form part of the force assembling under Lord Clyde for the suppression of the revolt. He was present at the siege and capture of Lucknow, and afterwards was with Lord Clyde in Oudh and Rohilkund.

"Sir H. Norman said of him at this time, that his delight in the campaigning was great. Elderly man as he was (54) when he thus took the field for the first time, he was like a boy in his glee at scouring the country hither and thither, every now and then under fire. At the staff mess he was a most joyous and popular member, even those of the staff who were inclined to look upon him as somewhat impracticable, could not help liking the good, sagacious, brave man."

His last public service before becoming a General Officer was as Commandant of the School of Military Engineering. Like every other duty in which he was engaged, he devoted his whole thoughts and energies to the improvement of the system at the time being carried out at that establishment. He seems to have become disheartened at the apparent non-success of the

reforms which he initiated. His great friend at this time was Sir William Denison, R.E., the Governor of Madras, and to him he poured out his troubles. The letters he wrote are not now to be traced, but we may gather something of their pith in the following extracts taken from the replies sent to him by Denison, and which are published in his "Varieties of Viceregal Life":—

"I am sorry to hear from you that you do not anticipate success in your endeavour to improve the character of the instruction given at Chatham to the young officers of the Corps. Now I do anticipate a good deal. In all institutions of this kind, I look a good deal more to the head of the institution than to the system. It is too much the fancy of the present day to think that men are mere machines, that a certain routine can be carried out with young men or boys, by which (to a great extent, irrespective of the people who administer the system and carry its details into practice) a perfect *homunculus* is turned out, fitted either to lead an army or govern a state. Now all my experience contradicts this, and tells me that a good system badly administered, or rather, administered merely as a system, is far inferior in its results to an indifferent system worked by a man who is in earnest. Now my reason for thinking that you will produce a good effect is a conviction on my part that, in the first place, you are in earnest, and, in the second, that you have sympathies with the young, that you are not old in mind, though both you and I are getting on in years. Take then my advice, my dear fellow, and go straight ahead in the line you mark out for yourself; work upon the young men by the influence of example, by bringing the stores of knowledge which you have accumulated during the thirty-five years we have been alongside each other in the corps to act upon their minds; stimulate their appetite for every sort of information; do not bind them down to the 'narrow gauge' of purely professional study, but let them work on the 'broad gauge' of general science, and you will turn out good officers and useful men, I will answer for it." . . . .

In a second letter, written in the following year, he says:—

"I have always maintained that the Inspector-General of Fortifications should make a point of knowing the qualifications of his officers, and thus be able, when applied to by any department of the Government, to supply an officer competent to do and do well the particular work required. Science in all its branches, art in its various applications, should find representatives amongst us, and I think it will be one of your privileges to develop the idea among the young officers under you at Chatham. I should not attempt to tie them down too strictly to any particular routine. Of course there are certain subjects with which they must be thoroughly acquainted, certain things which they must be able to do; but apart from these I should encourage the widest scope of study; I should open the door to an unlimited area of research. All

physical science, every branch of natural history, all the arts and their appliances are open to you, and I should be glad to see individuals taking up in *earnest* particular branches of study, and should afford them every assistance, with a special reference to the benefit which would result to the corps. Your library, your museum, your observatory might offer subjects of interest to many, and lead them to particular fields of observation."

There is no doubt that Harness was one of the most successful Commandants ever placed at the head of the School. He had the rare art of winning the confidence of the young, a gift which he possessed, doubtless, owing to the extreme freshness and buoyancy of his own character; these led him thoroughly to sympathize with all the aspirations and desires of the young, with whom he could be a very boy himself. Denison thoroughly appreciated this element in his character, and his letters no doubt proved a great encouragement to Harness.

At the close of his residence at Chatham he retired from the service with the rank of Major-General, but even then he was not allowed much repose. He became a member of both the Defence Committees appointed to carry out the recommendations of the Royal Commission on the National Defences. He was also employed by the Privy Council to prosecute the necessary measures for the suppression of the Cattle Plague. In this capacity he was installed in London as virtual dictator over the cattle trade of the kingdom. During this time Sir Arthur Helps said, that the Privy Council heard more plain truths boldly said, from General Harness, than they were accustomed to.

He died in 1883 at the age of 79 years, having reached the rank of General. He obtained the distinctions of C.B. and, later on, of K.C.B. for his eminent services in India.

Major-General Sir HENRY DURAND, K.C.S.I., C.B.,

obtained his commission in the Bengal Engineers in 1828. On the completion of his studies at the Royal Engineer Establishment at Chatham, Sir Charles Pasley wrote a special letter of recommendation about him, in which he said that Durand was "one of the most distinguished young Engineers whom I have ever had under me, both in respect to diligence, ability, and conduct."

In due course he proceeded to India, where he was stationed in the North-West Provinces, on the Jumna Canal, with Napier

and Baker. This was a happy selection so far as his subsequent career was concerned, as it gave him an excellent opportunity, whilst carrying out his irrigation duties, for studying the agrarian tenures, the productive capacities, and the economical conditions of those provinces, an opportunity of which he availed himself to the utmost. It was not long before he showed such marked signs of ability and political insight, that he was selected for the post of Secretary to the Agra Board of Revenue, which had never before been filled by a military officer. He continued to discharge the functions of this office until the outbreak of the first Afghan war, when he threw it up for the purpose of seeing active duty. Whilst serving as an Engineer through this campaign, it fell to his lot to undertake the duty of blowing in the gates of Ghuznee, an operation rendered necessary by the absence of any siege train. In reference to this brilliant episode, it may be remarked that in the obituary article which appeared in the "Times" newspaper on the occasion of Sir Henry Durand's tragic death, more importance was laid on his share in the work than it appears he really deserved. This called forth a remonstrance from Lord Keane, who wrote:—

"The credit of the brilliant idea of blowing in the gate was entirely due to Captain Thomson, the Chief Engineer, now Colonel Thomson, C.B. Lieut. Durand performed his part of firing the train with great coolness and self-possession, being fully exposed to the enemy's fire from the ramparts while he applied the match to the hose, which he had some difficulty in getting alight."

The other Engineers engaged with him in this hazardous duty were Captain Peat and Lieutenant Macleod.

After the termination of the campaign, he proceeded on furlough to England. Whilst there he was thrown in contact with Lord Ellenborough, who was about to proceed to India as Governor-General, and was offered the post of Aide-de-Camp by the new Viceroy. This he accepted, and accompanied his chief to India. He was soon made Private Secretary, a place which he held for two years, from 1842 to 1844. He was then given the Commissionership of Tennasserim. In this position he raised a storm of official anger by his stern repression of corruption, and the energy with which he attacked the lax administration of the province. He was a man of blunt speech and strong will. His determined antagonism to all official neglect led him to speak and to act with extreme vigour, and thereby he raised powerful enemies. He was recalled to Calcutta, and whilst there the first Sikh war broke out. Durand hastened to join his Corps for duty in this new scene of action, and was present at the battles of Chillianwallah and Goojerat, for which he received a Brevet Majority.

At the termination of the war he was appointed Political Agent at the Court of Scindiah, at Gwalior, where he guided the delicate complications of Mahratta politics with consummate skill. From Gwalior he was transferred in 1849 to Bhopal, and from thence he was promoted to Nagpore. During his residence at these Native Courts, Durand had great opportunities for studying the several conditions of the people of India under the rule of their own sovereigns, and he ventilated his views in a series of Essays which were published in the "Calcutta Review." In 1854 he returned to England, where he remained three years, at the expiration of which time he was selected as Political Agent at Indore, and returned to India to take up his new duties.

It is well known that when the Mutiny broke out, the fidelity of Holkar was very doubtful, and had any but a strong man been at his Court, he would most probably have thrown in his lot with the mutineers. As it was, his army revolted, and the residents at Indore, including Durand, were compelled to retire from the place. Their intention was to retreat towards Mundlaisir, where Durand had made a defensible post in case of emergency. The destination was, however, changed for Sehore, as the troops who had remained faithful, and were with them, insisted on this course, as their families were residing at that place.

"During all this trying march the courage and presence of mind displayed by Mrs. Durand were invaluable in keeping up the spirits of the fugitives, and extorted the highest admiration from the officers of the force. In August she died at Mhow, from the effects of the fatigue and hardships she had undergone."—(Plunkett's Memoir of Durand—"Profess. Papers," vol. xxii.)

A force of about 1,400 was collected at Mhow, whither Durand had retired, and this took the field as soon as the rainy season subsided. Brigadier Stuart commanded, but Durand, as agent to the Governor-General for Central India, acted as Political Officer, and had the general direction of the campaign. The first point attacked was Dhar, outside which the rebels were defeated, and the siege of the fort commenced. The enemy did not await an assault, but escaped in the night, leaving their guns behind them. From this place the column marched northward to Mundesoor, where a large force of the rebels had assembled. Here they inflicted two severe defeats on their adversaries, dispersing their force with heavy loss. The column then marched southwards, and returned to Mhow and Indore, where it arrived on December 15th,

"when, though the reinforcements which he had been looking for from the north had not arrived, Durand called upon Holkar's regiments to lay down their arms. The whole of the troops (including the two regi-

ments which had taken part in the attack on the residency) quietly submitted, and the next day Durand handed over charge to Sir R. Hamilton, during whose absence in England he had held political charge of Central India."—(*Ibid.*)

There is no doubt that by his promptness and energy he kept the rebels at bay, prevented their penetrating southward, and so saved that part of India from joining the revolt.

The mutiny being crushed, Durand returned to England. At this time much debate was taking place on the subject of the transfer of the Government of India to the Crown, and the numerous changes, reforms, and amalgamations, consequent on that important step. Durand was placed on the Council of the Secretary of State, where he rendered conspicuous service. The able minutes which he penned upon the various branches of the subject, prove him to have had a statesmanlike grasp of the questions submitted for decision, and his views carried great weight. From this duty he was recalled to India by Lord Canning, who appointed him Foreign Secretary at Calcutta. This nomination created a storm of opposition amongst the members of the Civil Service who surrounded the Governor-General; but in spite of clamour he remained firm, and his selection was ratified by the Secretary of State, Sir Charles Wood.

After four years' service in this Department, during which he amply justified Lord Canning's selection, he was named, in 1865, Military Member of the Council of the Governor-General, a post in which he was called on to perform the duties of a War Minister. Lord Elgin had died in 1863, and was succeeded by Sir John Lawrence. This Viceroy had been bred in the Civil Service of India, and he very naturally looked somewhat coldly upon the pretensions of a military interloper to seek for advancement in the upper grades of that service. Hence the transfer to a military department; and when the Governorship of the Punjab fell vacant, he declined to offer the post to Durand, although his claims were undoubted. It was not until under the rule of his successor, Lord Mayo, when it again fell vacant, that Durand at length reached the goal of his ambition. Lord Mayo was not swayed by the feelings which had influenced Sir John Lawrence, and he chose the best man to be procured, without reference to his not having been born in the purple of the Civil Service. His choice was ratified by the general consensus of Indian opinion.

The Governorship of the Punjab is a post second only to the Viceroyalty. It is our barrier against Central Asia, and as such forms the most important outwork to British power

in India. The people are brave, hardy, and self-reliant, requiring a vigilant and firm ruler. These qualities were pre-eminent in Durand, and it was universally felt that he was the man for the place. Unfortunately, he was not destined to live long enough to justify Lord Mayo's choice. Whilst he was still engaged in his first tour of inspection through the province, he met with the accident which caused his death. On December 31st, 1870, he was entering the town of Tonk, on an elephant; the howdah struck the top of the gateway, and was carried away. He fell heavily to the ground, was picked up insensible, and on the following day he died.

All personal unpopularity due to his bluntness of speech and intolerance of indolence or abuse, vanished when it became known that he had been thus unfortunately removed from the sphere of his labours, whilst in the prime of his intellect and in the full maturity of his powers. It was universally admitted that by his death India had lost one of her ablest men and wisest administrators.

General Sir WILLIAM E. BAKER, K.C.B.,

obtained his commission in the Bengal Engineers in 1828. Soon after his arrival in that province, he was placed in the Irrigation department in the North-West Provinces, under Colonel Colvin. This was at the time the post most sought after by young officers, and was made the subject of careful selection. Napier (afterwards Lord Napier of Magdala) and Durand (afterwards Sir Henry Durand), were both colleagues of Baker in the service of the great Jumna Canals, and there is no doubt that all three of these distinguished officers owed much of their after success to the training they there received. When Colvin returned home in 1836, Lieutenant Baker succeeded him in charge of the Jumna Canals, which he held until 1843. In that year Sir Charles Napier applied to the Governor-General for the best scientific assistance he could furnish him with, for the development of irrigation works in Scinde, and Lord Ellenborough selected Captain Baker, and despatched him thither with the appointment of Superintendent of Canals and Forests. In 1845-6 he took part in the Sutlej campaign. At Sobraon he guided the main attack on the Sikh intrenchments. Lord Harding thus refers in his General Order to Baker's services:—

"To Captain Baker and Lieut. Becher, of the Engineers, the Governor-

General's acknowledgments are due, for leading the Division of attack into the enemy's camp. These officers well maintained the reputation of their Corps whenever gallantry or science may be required from its members."

After three years' leave in England, Baker, on his return to India in 1851, was appointed by Lord Dalhousie to the office of Consulting Engineer to Government for Railways. In 1854 he was made, in addition, Secretary to the Government of India, in the Public Works Department. In 1857 he returned to England permanently, and was then appointed Military Secretary at the India Office. In 1860 he was placed on the Council of India, a post which he held for fourteen years.

It was Sir William Baker who established the irrigation system now in force in Scinde, and he was also the chief creator of the railway system of Bengal. To him fell the duty of organizing the Public Works of India as a separate department of the State, and he was one of the principal advisers of the Government during the anxious period of the change from the old to the new army system in that country. His opinions and strong, clear judgment carried the greatest weight with all the statesmen under whom he served, or with whom he was thrown in contact. At the same time those who served under him invariably looked up to him with the utmost respect and confidence, as one well fitted to guide and command. He was a thoroughly practical scientific geologist, and formed a most valuable collection of the fossils of the Liwalik range. He presented the Natural History Museum, at South Kensington, with one of the most valuable of his discoveries in this line, in the form of two gigantic tusks of a fossil elephant, eleven feet in length. He died in 1881.

Captain FRANCIS FOWKE

joined the Royal Engineers in 1842. From an early date in his career he displayed considerable inventive ingenuity. When stationed at Bermuda, as a young subaltern, he excited attention by numerous clever devices connected with the rigging of yachts, his tastes having led him to spend much of his time in sailing. On his return to England he was sent to Devonport, where he gave the first signs of the brilliant architectural and constructive genius for which he was afterwards celebrated. The Raglan Barracks at that station were entirely designed by him, and in this work he introduced many useful novelties for the benefit of

the soldier. Some of these were at first but little appreciated, but they have since been generally adopted in all new barrack-constructions. His inventive powers were not meanwhile idle in other directions. He designed a drawbridge on a most ingenious principle, and devoted much thought to the adaptation of rifling to heavy ordnance for the use of elongated projectiles. In this he was the precursor of both Armstrong and Whitworth. Pontoons also attracted his attention, and he invented one on a collapsing principle, which, although not adopted at home, met with much success in America.

In 1854 he was invited by Captain Owen, who was Secretary to the British Commissioner for the Paris Exhibition of the following year, to assist him in superintending the Machinery Department. This he undertook to do, and when Captain Owen was called away from his post to proceed to the Crimea, Fowke took his place as Secretary. For his services in this capacity he was nominated to the Legion of Honour, but as the decoration was given for civil and not for military service, he was refused permission to wear it.

At the conclusion of his Paris work he was attached to the newly formed Science and Art Department as an Inspector, and on its transfer from Marlborough House to South Kensington, he was charged with the superintendence of the buildings to be erected there. This was no easy matter. Sir William Cubitt had constructed some long iron sheds with semicircular roofs, since nicknamed the Brompton Boilers, and in their vicinity stood a cluster of old houses. These were the original materials which he was called on to develop into a museum. One of his first efforts in this direction was the design for a gallery to contain the pictures presented to the nation by Mr. Sheepshanks.

"As an architect, he demonstrated an accurate formula upon which a picture-gallery must be built, in order to exhibit pictures without glitter or reflection."—(Cole.)

This gallery proved so successful that he was called on to add others for the reception of the Vernon and Turner bequests. Cole, in his Life of Fowke, narrates, that he was staying with the Marquis of Salisbury at Hatfield, the Chancellor of the Exchequer (Mr. Disraeli) being also present. The Marquis informed Fowke late at night, that the Treasury had decided on carrying out the work, and wished it to be vigorously pushed forward. The next morning at breakfast, Disraeli asked Fowke how soon it could be begun. "They have begun already." "How so? you only knew last night at twelve." "I was at the telegraph office at Hatfield as soon as it was open. I ordered the works to begin,

and I have received an answer that the foundations are being dug." "I call that work," said Mr. Disraeli.

For the remainder of his life he was engaged on architectural and engineering works, a mere list of which is all that can here be given. He designed the interior of the Dublin National Gallery, the elevation for which had already been decided on. Also the Museum of Science and Art at Edinburgh. He planned a drill shed for the 1st Middlesex Engineer Volunteers, covering 100 feet by 40 feet, which Sir Joseph Paxton pronounced the cheapest structure he had ever seen. The only funds available amounted to £100, and it cost no more. The principle he there devised has since been freely adopted elsewhere. When a part of the ground purchased by the Commissioners of the Exhibition of 1851 was being laid out for the Horticultural Society, he gave the general plan, and designed the conservatory and south arcade. In the first of these he introduced gas with such perfect ventilation, that even when most brilliantly lighted the plants in no way suffer. He also designed the Library at Aldershot for the Prince Consort, whose gift it was—and the Prince sent him a box of instruments with the following inscription: "Captain Francis Fowke, Royal Engineers, as a token of regard from Albert, 1859."

His next work was the design of the structures for the International Exhibition of 1862. His services in this matter have been detailed in the Chapter on International Exhibitions. When it had been decided that the buildings should be removed, the Government purchased from the Commissioners of 1851 a portion of the site for the purpose of erecting a Natural History Museum, in relief of the overcrowded collections of the British Museum. An open competition was arranged for the production of a design. The judges were Lord Elcho, Mr. Tite, Mr. Fergusson, Mr. Pennethorne, and Mr. D. Roberts. Their award of the first prize was given to the set of designs marked "*Ad ogni uccello il suo nido e bello.*" When the sealed envelopes containing the competitors' names were opened, it was found that Captain Fowke was the successful architect. His death prevented the execution of his work, and the Natural History Museum now standing on the site is the production of Mr. Alfred Waterhouse.

Fowke also drew up plans for the permanent buildings of the South Kensington Museum, and lived to carry out some of them. In 1864 he produced his last great work, the general design for the Albert Hall, which was completed after his death by Major-General Scott.

Meanwhile, in the intervals of his more important studies, he had been giving free play to his inventive powers. Amongst the

list of these productions of his genius may be named a very portable military fire-engine, a collapsing photographic camera, an improved umbrella, for which he took out a patent, a portable bath, and a machine, by means of which, hundreds of gas-burners can be lighted in a few seconds. This was adopted at the South Kensington Museum.

In the spring of 1865 Captain Fowke found his health broken down from over-work, and went abroad to seek recovery. This, however, was not to be. Although he became slightly better from the cessation of active work, the benefit was but transitory. He returned home, and after a short stay at Eastbourne came back to South Kensington, where, on December 4th, 1865, two days after his arrival, he died from the bursting of a blood-vessel. A bust of him by Woolner has been placed in the Museum. This brief notice of the most brilliant constructive architect the Corps has produced, cannot be better closed than by quoting the words pronounced by Sir Henry Cole, at the Society of Arts, in alluding to his death:—

"I firmly believe that the arts of construction in this country have sustained a great loss by Captain Fowke's death. At this period, when art is so transitional, and science is making so many discoveries, and men's minds are seething with inventions, when the use of new materials is constantly entered upon, England has lost a man who felt the spirit of his age, and was daring enough to venture beyond the beaten path of conventionalism. Captain Fowke, to my mind, was solving the problem of the decorative use of iron, and by appreciating the spirit both of the Gothic and Renaissance architects, was on the threshold of introducing a novel style of architecture when, alas! death, at the early age of forty-two years, has cut short his promising career."

Major-General WILLIAM WILBERFORCE GREATHED, C.B.,

obtained his commission in the Bengal Engineers in 1844, and proceeded to India at the close of his Chatham training. After a short period in the Irrigation Department of the North-West Provinces, he joined the Field Force marching against Mooltan. He served in the two sieges of that fortress, and then accompanied General Whish's column to the Northern Punjab, and was present at the battle of Goojerat. After this he returned to his irrigation duties for a short time, being then transferred to the Railway Department, in which he was employed when the mutiny broke out in 1857. On this he was summoned to Agra

and attached to the Staff of the Lieutenant-Governor of the North-West Provinces, as a confidential Aide-de-Camp. The day of his arrival at Agra, he was despatched to Meerut, with instructions to restore order, and reopen communications as far as practicable. The force he was to have picked up on the road had disappeared, but Greathed succeeded in collecting a few horsemen, and with them made his way to Meerut. Returning to Agra, he was sent on a second expedition to relieve some persons beleaguered in a factory in the Doab. In this he was successful. His next mission was as bearer of despatches from Lord Canning, for the General in command of the force moving on Delhi. The peril of this mission was very great, but it was accomplished in safety. Arriving at the camp before Delhi, he was appointed extra Aide-de-Camp to Sir Henry Barnard. He served throughout the siege, and at the assault on September 14th, led one of the assaulting columns, and was severely wounded. After recovering he resumed active service, and at the attack on Lucknow, in March, 1858, acted as Directing Engineer. For these services he received repeated honourable mention in despatches, and was promoted to a Brevet Majority as soon as he became a Captain, viz., in August, 1858. Lord Canning pressed his claims for further reward, giving it as his opinion to the Secretary of State, that the recognition which Major Greathed had received, appeared to him quite incommensurate with his services. In consequence of this remonstrance, a civil C.B. was conferred on him in 1860, on which Greathed remarked, "I accept it thankfully three years after date, but it is a new idea to me that my occupation in 1857 was *civil*." He served as extra Aide-de-Camp to Sir R. Napier, in the China expedition of 1860, and after the capture of Pekin, was sent home with despatches. In March, 1861, he was appointed Assistant Military Secretary at the Horse Guards, to aid in the amalgamation of the Indian army, and remained on the home Staff until his promotion to Lieutenant-Colonel. He then returned to India, and was appointed Chief Engineer of the Irrigation Department of the North-West Provinces. He was in command of the Royal Engineers at the reception of the Prince of Wales at Delhi, in January, 1876, shortly after which he returned in ill health to England, where he died in 1878. He had been awarded the Telford medal, for a paper on the subject of his Irrigation works; and he had medals with clasps for the Punjab, for the Mutiny, and for China. He had been honourably mentioned eighteen times in despatches, ten times in General Orders, as well as in a memorandum by the Lieutenant-Governor of the North-West Provinces, and in a minute by the Governor-General.

Colonel CHARLES CORNWALLIS CHESNEY

joined the Royal Engineers in 1845. His name had become well known as a military historian before the study of that science had become popular. In this he was greatly assisted by his aptitude for foreign languages. The outbreak of the American civil war gave him a favourable opportunity for applying his acquired knowledge. By his writings and lectures on the campaigns of this gigantic struggle, he at once took rank as an authority on military history. In the United States his essays were recognized as forming the most scientific, and at the same time impartial, critical narrative extant. His "Waterloo Lectures" obtained for him an equal reputation in his own country. He was a frequent contributor to the "Edinburgh Review," his articles in which, on Modern Warfare, were highly esteemed. Colonel Chesney's name deserves record as one of the first and most talented pioneers in a field in which he has had many eminent followers. He died in 1876, aged 49 years.

General JOHN ARCHIBALD BALLARD, C.B.,

obtained his commission in the Bombay Engineers in 1848. As a subaltern officer he served in Omar Pasha's campaign, on the Danube in 1854-55, including the siege of Silistria, the battle of Giurgevo, and the advance to Bucharest. Speaking of the former, Kinglake says:—

"Lieut. Ballard, of the Indian Army, coming thither of his own free will, had thrown himself into the besieged town, and whenever the enemy stirred there was always, at the least, one English lad in the Arab Tabia directing the counsels of the garrison, repressing the thought of surrender, and keeping the men in good heart."

His extreme calmness under fire gave him much influence over the Turkish soldiers. On one occasion, noticing that a young recruit was firing wildly, he accosted him thus, "My friend, don't be in a hurry; you will fire better with a rest; take aim over my shoulder." And the poor man was compelled to have a shot with his rifle resting on the officer's shoulder. The ridicule had its proper effect, and the soldier completely recovered his nerve.

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He accompanied Lieutenant-Colonel Simmons, R.E., with the Turkish army when they proceeded to the Crimea in support of the allied forces after Inkermann, and was present at the battle of Eupatoria. He also took part in the expedition to Kertch. When, after a long delay, Colonel Simmons was permitted to attempt the relief of Kars by landing a Turkish column on the coast of Asia Minor, Ballard commanded a brigade of rifles, and at the battle of Ingur did excellent service. For this, and his previous good work, Simmons recommended him so strongly for reward, that although he was at the time only a subaltern, the honour of the C.B. was conferred on him. It is believed that this is the only instance on record of such a distinction. In 1856-7 he served in the Persian expedition as Assistant Quartermaster-General, and head of the Intelligence department, and afterwards in a similar capacity with the Rajpootana column during the Indian Mutiny. In later years he was made Master of the Mint at Bombay, and reached the rank of Lieutenant-General at the early age of 48, when he retired from the Corps in 1878 with the honorary rank of General. He died of apoplexy whilst inspecting the Pass of Thermopylæ in 1880.

Major-General CHARLES GEORGE GORDON

obtained his commission in the Royal Engineers in 1852. After the usual residence at Chatham, he was sent to Pembroke, whence in the winter of 1854 he was ordered to the Crimea, which he reached in company with Captain the Hon. H. F. Keane, on Christmas Day. His services at the siege of Sebastopol were those falling to the lot of a subaltern of Engineers, and were very harassing and fatiguing. Even at that early age he showed such signs of earnestness, zeal, and thoroughness in the discharge of the multifarious duties which he was called on to undertake, as brought him to the notice of his seniors. When the siege terminated, his name was included in the list of those Engineer subalterns who Sir Harry Jones considered had especially distinguished themselves, and for whom he sought to snap the bonds of red tape, and procure promotion. In spite of the support which his application received both from Sir James Simpson, then in command of the army in the East, and also from Sir J. Burgoyne as Inspector-General of Fortifications, he did not succeed, and Gordon was one of those Engineers who gained nothing for the arduous toil of the first nine

months of 1855 beyond the somewhat barren distinction of the Legion of Honour. After the place had fallen he was selected to accompany the expedition to Kinburn as one of the subalterns of Captain Nicholson's Company Royal Sappers and Miners. Nothing worthy of record was, however, achieved, and Gordon returned to the army, where during the winter months he was employed in the works of demolition that were being carried out at Sebastopol.

As soon as peace had been established, Gordon was appointed Assistant Commissioner in company with Lieutenant E. R. James, R.E., under Major Stanton, R.E., for the delimitation of the new boundary between Russia, Turkey, and Roumania, the first-named of these Powers having been called on by the Treaty of Paris to surrender a large slice of territory. He was engaged for nearly a year on this line, and was then passed on for similar duties under Lieutenant-Colonel Simmons, R.E., on the Asiatic boundary. It was whilst employed in this direction, that he was first thrown in contact with those wild tribes whose characteristics he was so ready to master, and in dealing with whom, or with those of a similar temperament, he was gradually to prove himself such a born leader of men. His work being finished, he returned to Constantinople, where he was present at a conference of the Commission, after which he started for England on six months' leave. His second tour of duty in Armenia was but brief, and consisted only in verifying the boundary that had been laid down. That done, he again returned to England, and was appointed Field Work Instructor at Chatham, a duty which his lengthened apprenticeship in the Crimean trenches rendered him well qualified to undertake.

In the middle of 1860 Gordon, who had been promoted Captain in the previous year, left England to join the force proceeding to China, and reached Hong Kong early in September, whence he pushed forward to Shanghai and Tientsin, to join the army. He arrived in time to be present at the capture of Pekin, and the destruction of the Summer Palace, after which he retired with the army into winter quarters at Tientsin, where he filled the post of Commanding Royal Engineer. Whilst there he made several excursions into the neighbouring districts, and on one occasion penetrated farther than any other European had done, and at the same time, with his companion, Lieutenant Cardew, visited and explored a considerable section of the Great Wall of China. During this tour they had a very narrow escape from being murdered at Taiyuen.

On April 28th, 1862, Captain Gordon left the Peiho for Shanghai, as Commanding Royal Engineer to a force intended to

clear the country of rebels in a radius of thirty miles round that city. In pursuance of this design, the expedition, under the command of General Staveley, captured in succession a number of fortified towns. Gordon, as his Engineer, rendered him great assistance, which he thus described:—

"Captain Gordon was of the greatest use to me when the task of clearing the rebels from out of the country within a radius of thirty miles from Shanghai had to be undertaken. He reconnoitred the enemy's defences, and arranged for the ladder parties to cross the moats and for the escalading of the works, for we had to attack and carry by storm several towns fortified with high walls and deep wet ditches. He was, however, at the same time a source of much anxiety to me from the daring manner he approached the enemy's works to acquire information."

The districts having been cleared, Major Gordon (he had received a brevet for his services at Pekin), was engaged for the next few months in a careful survey of the tract of country thus rendered accessible. Of this work he wrote:—

"I have been now in every town and village in the thirty miles, radius. . . . . I do not write what I saw, as it amounts to nothing. There is nothing of any interest in China; if you have seen one village you have seen the whole country. I have really an immensity to do."

The time had now arrived when Major Gordon was to be called to occupy a position in which he was able to show what manner of man he was. The struggle between the Imperialists and the Taiping rebels had been carried on with varying success for a lengthened period. The latter had gradually grown into a most formidable body, under the leadership of Hung, who having had some instruction in Christianity from a European missionary, had evolved a fantastic revelation, in which he figured as the Second Celestial Brother to the Almighty. He assumed the title of Heavenly King and Emperor of the Great Peace, and being joined by a vast horde of pirates and others, attracted by his doctrine of universal plunder, eventually made himself master of Nanking, where, under the shadow of the Porcelain Tower, he established himself in royal state. From this central point he despatched his hordes, devastating the country in all directions. The Chinese Government finding themselves unable to cope with the rebel force, applied to the English and French Ambassadors for help. The European inhabitants of Shanghai, who were menaced with destruction from the vicinity of the Taipings, had already commissioned two Americans, Ward and Burgevine, to raise a contingent and endeavour to make head

against the common enemy. Ward, after sundry expeditions, in which he was not very successful, had been killed, and Burgevine was found utterly unfitted in every respect to take his place. Li Hung Chang, the Imperialist Governor of the Kiang provinces, applied to the British General, Sir Charles Staveley, to appoint one of his officers to take the command from which Burgevine had been deposed, and Gordon was the man named.

After some deliberation, he accepted the post, and in a letter written at the time he shows the spirit in which he did so :—

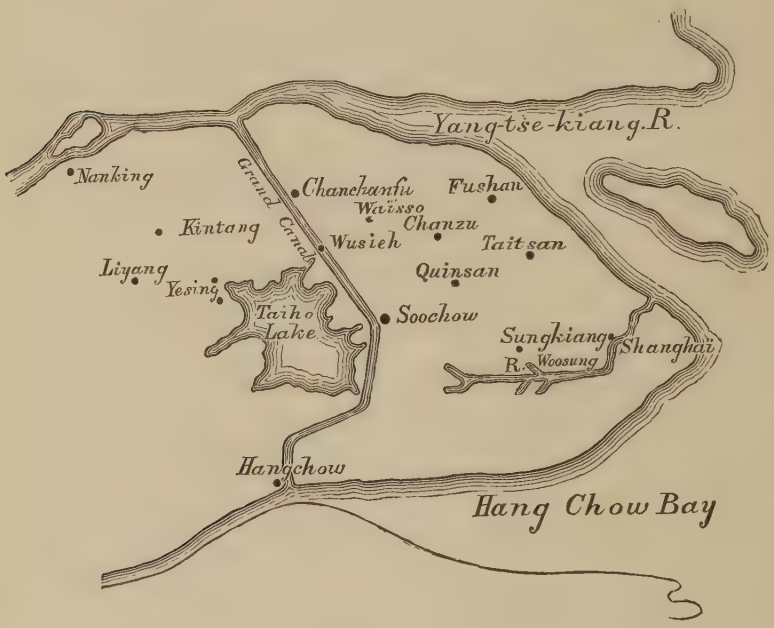
"I have taken the step on consideration. I think that anyone who contributes to putting down this rebellion fulfils a humane task, and I also think tends a great deal to open China to civilization. I will not act rashly. . . . I think I am doing a good service."

The force which was placed at his disposal was at the time at Sung Kiang. It consisted of about 3,000 Chinese, recruited in the district, and officered by some 150 foreigners, Americans being in the majority; whilst amongst the others were Englishmen, Germans, Frenchmen, Spaniards, Italians, Poles and Greeks. Some of them were men of good character, but many were adventurers of the worst type and utterly heedless of control. This was the material out of which Gordon moulded his "Ever Victorious Army," and it was by the power of his influence and indomitable will that he instilled discipline into his officers and bravery into his soldiers.

The district within which he was about to act was that of Kiang-nan, lying between the Yang-tse-kiang river on the north, and the bay of Hangchow on the south. The peninsula thus formed was about 200 miles long and 150 broad in its greatest width. The city of Nanking, the head-quarters of the rebels, was on the extreme north-western point, whilst Shanghai was at the eastern apex of the peninsula about 25 miles from the sea. The whole district was a dead level, teeming with fertility, and densely peopled. It was intersected in all directions by rivers, creeks, and canals.

"In warfare in such a country—a vast network of canals and tow-paths where there are absolutely no roads, where wheeled vehicles are never used, and where the bridges still remaining were scarce and precarious—Gordon's survey experiences were of incalculable use. It was an immense advantage to know what canals were still navigable, which, choked with weeds; where the ground would bear artillery, and where it was an impassable swamp. 'He knew,' writes one of his officers, 'every feature of the country better than any other person, native or foreigner—better even than the rebels who had been in partial possession for years.'

And he strengthened his hand by the formation and use of a flotilla of armed steamers and gun-boats, which in that water-intersected country served both to cover and flank all his movements, and also, by swiftly transferring the force from one point to another, to multiply it to the enemy's imagination."*



Map of the District of Kiang-nan.

Gordon reached Sung Kiang on March 25th, 1863, and at once assumed command of his force. He had with him Captain Stark, 67th Regiment, Ensign Stevens, 99th Regiment, Mr. Cooksley, of the Commissariat; Lieutenant Ward, R.A., and Dr. Moffat, 67th Regiment. These were to be the heads of his various departments. At this time the Taipings were besieging Chanzu. Gordon determined to relieve the place, and by the same action strike a blow at Fushan, ten miles nearer the coast, which was held by the rebels. With 800 infantry and 200 artillery, carried on board two of his steamers, he coasted along until he was in the vicinity of Fushan, where he landed his force on April 3rd, and advanced against the town. After a short bombard-

* Forbes' "Chinese Gordon," page 50.

ment from a 32-pounder gun and four 12-pounder howitzers, he sent forward a storming party and captured the place. The panic amongst the rebels was so great at this unexpected blow that they abandoned the siege of Chanzu and retired. This was the first of that series of rapid blows by which Gordon trained his little army to consider itself invincible, and at the same time established a wholesome panic amongst the Taipings.

It should be mentioned that an Imperialist-force, under the command of a Mandarin named Li Adong was in nominal co-operation with Gordon, but without any control over him, and only lending support when called upon to do so. The main object which Gordon now had in view was the recovery of the great city of Soochow, which had been held by the Taipings for three years; but as a preliminary to this it was necessary that the towns of Taitsan and Quinsan (the latter being the arsenal of the Taipings), should be captured. Neither of these was in itself an easy task. Taitsan was garrisoned by 10,000 men; numerous English, French, and American adventurers being their leaders. Undeterred by the magnitude of the undertaking, Gordon with his 3,000 men made a dash at it. Here is his own account of the attack :—

"I left Sung-kiang with some 3,000 men on the 24th April, and intended to attack Quinsan, a large town between Taitsan and Soochow. However, before I had arrived at the place, intelligence reached me that the Taiping forces at Taitsan, who professed to come over to the Imperialists, had treacherously seized the party sent to take possession. I immediately changed my route and marched on Taitsan, attacked the two large stockades on one day, and the town on the next. The rebels made a good fight, but it was no use, and the place fell. Taitsan was very important, and its capture well merited, after the treachery shewn by the head chief, who was wounded in the head. It opens out a large tract of country, and the Chinese generals were delighted, and have said all sorts of civil things about the force. I am now a Tsung Ping Mandarin (which is the second highest grade), and have acquired a good deal of influence."

On the capture of Taitsan, the Imperialists secured possession of seven prisoners, whom they cruelly tortured and then beheaded. This was made the ground of an attack against Gordon. Much discussion arose in the English press, but investigation by General Brown, then commanding Her Majesty's forces in China, proved incontestably that Gordon's troops had no connection whatever with the transaction.

Gordon having determined on the strict enforcement of discipline, had taken the most stringent measures to prevent pillage, and had promised his force that their pay should not be with-

held from them. In this, however, he failed to take sufficiently into account the dilatoriness and dishonesty of the Chinese officials. His troops, therefore, found themselves, on the one hand, in arrears of pay, a state of affairs to which they were well accustomed, and, on the other hand, deprived of plunder, a matter to which they were by no means so easily reconciled. It followed that after the capture of Taitsan there was much demoralization and discontent, and Gordon had to bring his army back to Sung Kiang to be reorganized. Here he secured the services of some Non-commissioned Officers and men of the British force at Shanghai, who volunteered to serve under the intrepid young leader, and who replaced those of the original officers whom he had dismissed or who had left him in disgust. In fact, throughout all his dealings with his Ever Victorious Army, Gordon was constantly being thwarted by the insubordination of the officers and non-commissioned officers in whom he was compelled so greatly to trust.

Having brought his men into some decent semblance of order, and quelled a mutiny amongst his majors, he started at the end of May, with 600 artillery and 2,300 infantry, for the attack of Quinsan, which was at the time being besieged after a fashion by the Imperialist troops under General Ching. The garrison was estimated at from 12,000 to 15,000 men. Quinsan was a large city, the wall of which was over four miles in circuit, surrounded by a wet ditch more like a canal, being over 100 feet in width. Ching had been attacking it from the eastern side, and was anxious that Gordon should penetrate at that point. This, however, did not appear to the young General a feasible plan, and he struck out one diametrically opposed to it. He ascertained that the only communication between Quinsan and Soochow was by a causeway over 20 miles in length, along the greater part of which a canal ran on the south, whilst it was closed in by a lake on the north. He also found that by making a wide detour he could bring his gunboats into the canal at a point called Chunye, about nine miles from Quinsan. This he proposed to occupy, and thus cut off the garrison from Soochow. He had with him a gunboat, commanded by an American named Davidson, who had frequently displayed such dash and bravery as to have made a name, both for himself and his craft the *Hyson*.

Gordon embarked on this boat, which mounted a 32-pounder gun and a 12-pounder howitzer, and having placed a small battalion of picked infantry on board the other boats, the flotilla sailed on its expedition. They arrived without difficulty just where the canal debouched on the one which ran parallel to the roadway at the point he aimed at, viz., Chunye, and this he

seized, the holders of the stockade that had been erected there having fled in panic at his approach. Leaving his infantry to occupy the position, he pushed forward on a reconnoitring tour along the canal towards Soochow, and arrived close to the city. Whilst on the way he encountered a large force marching on Quinsan, which he threw into the utmost confusion and routed by means of his gun and howitzer. Those who escaped returned to Soochow panic-stricken. As the day waned, the adventurous voyagers turned and steamed back to Chunye.

They found the battalion they had left there engaged with the garrison of Quinsan, who had also been terrified by the intelligence, brought to them by some fugitives from Chunye, that their retreat was likely to be cut off. It was now past ten o'clock and quite dark. Gordon in his gunboat dashed forward, and poured his fire into the seething mass which crowded the causeway. Back rushed the unfortunate garrison, their ranks torn with the discharges of grape from gun and howitzer, only to find when they reached the gates that Quinsan had been taken possession of by the Imperialists under Ching. They were all made prisoners, and a blow was struck at the rebel power in Soochow which had the greatest possible effect. It was estimated that between three and four thousand had that day been killed or drowned, and of the remainder who were taken prisoners, over 800 at once joined the ranks of Gordon's force. Indeed, this seems to have been one of the most successful parts of his policy. Whenever he took prisoners, he opened his ranks to such of them as chose to join him, and in this way recruited his army, which was constantly becoming depleted by desertion and casualties. Nearly half his men left him after the capture of Quinsan, owing to the prohibition of plunder, and their places were filled by the ex-rebels, who generally proved more trustworthy and gallant soldiers.

Gordon thus wrote of this affair:—

"The rebels never got such a licking before, and I think there will not be much more severe fighting. My occupying this city enables the Imperial Government to protect an enormous district, rich in corn, &c., and the people around are so thankful for their release that it is quite a pleasure." . . . . "The rebels' Wangs, or Kings, knew that a new English *piecee* had come when Fushan was taken, but did not expect him at Taitsan." . . . . "I have four English officers with me; we wear anything we can get, and the men are almost in rags." . . . .

Having captured Quinsan, Gordon determined to bring his head-quarters there from Sung Kiang, as from its central position it was better adapted to become a base for future operations. This change did not suit the taste of many of his men, especially

among those Non-commissioned Officers who had established relations at Sung Kiang which they did not care to see broken off. The artillery showed the worst spirit, and when ordered to march refused to fall in. A written proclamation was sent to Gordon expressing their determination, but they little knew the man they had to deal with. Assembling the Non-commissioned Officers, he demanded of them the name of the man who had written the paper. On their refusal, Gordon announced that one in every five of them should be shot. This was received with loud groaning. Gordon noticed that one of their number was especially active in his manifestations, and dashing at him drew him out of the ranks with his own hands, and ordered two of the infantry who were standing by to shoot him. This was promptly done, and the mutiny was quelled. The man who was shot turned out to have been the ringleader and the writer of the mutinous document.

The reduction of Soochow became the next object of Gordon's efforts. In order to effect this, he determined to isolate it by securing all the lines of communication. It would be impossible in this slight sketch to detail the various operations he carried out with this object. Suffice it to say, that, in the course of a short time he had captured Kahpoo, Wokong, and Patachlaou on the south, after which he swept round to the north and secured Leeku, Wanti, and Mouching. This completed the investment, as the Taiho lake on the west was controlled by his gunboats, and nothing now remained but to advance on Soochow. The Imperialist army under Ching had been left in charge of the southern posts, and Gordon on arrival at the city determined to penetrate on the eastern side. After the failure of a night attack which he led in person, he succeeded in securing all the strong posts commanding that side of the place. The Taiping garrison becoming alarmed, and feeling that an assault by the besiegers if successful would doubtless lead to a wholesale massacre, treated for surrender, and handed over a gate to Gordon's men as a guarantee of good faith.

We now come to an incident which caused the young leader the keenest pang and the bitterest anger.

He had guaranteed life to the Taiping leaders or Wangs, and, trusting to his word, they had proceeded to Governor Li's quarters to tender their submission. They were there treacherously murdered by him. Gordon, who was unaware of what had occurred, entered the city, where he fell into the hands of the Taipings, who were alarmed at the non-return of their leaders. For many hours his life was in imminent peril, and unquestionably had the truth become known in Soochow whilst he was detained he would have been killed. Fortunately it was not yet discovered,

and eventually Gordon was released with a view to enabling him to ascertain the reason of the delay in the return of the Wangs.

Once outside the town he soon learnt the facts. Indeed, he himself came upon the clearest proof of the butchery :—

"I found six bodies," he wrote, "and recognized Nar-Wang's head. The heads and bodies were gashed in a frightful way, and cut down the middle."

After searching in vain for Governor Li, who, knowing well what manner of man he had to deal with, had hidden himself, Gordon marched his force back to Quinsan, having determined to throw up his command, and to refuse all further aid to a cause stained by such treachery, whereby his own good fame, till then considered spotless by both friend and foe, had been imperilled. For a long time he held sternly aloof from the struggle. In vain the most flattering proclamations were issued by the Emperor. A medal of distinction of the highest class was to be conferred upon him because he "has displayed thorough strategy and skill, and has put forth most distinguished exertions." A gift of 10,000 taels (about £3,500) was also to be paid over to him. This he indignantly refused to accept.

"When the treasure-bearers entered his presence with bowls of bullion on their heads, like a train from the Arabian Nights, he flogged them from the chamber with his 'magic wand.'"*

and made the following reply to the Emperor :—

"Major Gordon receives the approbation of his Majesty the Emperor with every gratification, but regrets most sincerely that owing to the circumstances which occurred since the capture of Soochow he is unable to receive any mark of his Majesty the Emperor's recognition, and, therefore, respectfully begs his Majesty to receive his thanks for his intended kindness, and to allow him to decline the same."

Hake's reference to Gordon's "magic wand" leads to a description of what he there alludes to. Gordon never went armed, and when leading his troops in the thickest of the fight he bore nothing in his hand but a small cane. As he had frequently been exposed to the most imminent perils, and had hitherto escaped untouched, whilst so many of his officers and men were falling around him, his soldiers had gradually come to attribute his invulnerability to the virtues of what they looked upon as his "magic wand." This belief in his occult powers, no doubt, had much to do with the marvellous influence he gained over them.

* Hake's "Story of Chinese Gordon," pp. 155, 156.

He seems to have been able to instil confidence and courage into all who were thrown in contact with him. No sooner had he won a victory and secured a body of prisoners, than the majority of them, men who but the day before had been fighting to the death against him, at once changed sides and enlisted under his banner. If it had not been for the recruits who came to him *en masse* from the ranks of the enemy his force would soon have melted away. The contrary was the case, and the men whom he thus attracted to his standard proved far more valuable and staunch as soldiers than the majority of those whom he had originally trained.

After some months of inaction it became clear that if he abandoned the Imperial cause all that he had already done would be wasted, and the destructive and desolating sway of the Taipings would be once more spread over the district from which he had driven them. Gordon was not the man to allow private resentment, no matter how justly aroused, to interfere with what he considered was for the public good. Eventually therefore, he consented to resume active operations, having compelled Governor Li to issue a proclamation exonerating him from all complicity in the massacre of the Wangs.

The position of affairs since the capture of Soochow was this :— The district of Kiang-nan is roughly divided into two parts by the Grand Canal. The eastward half from Soochow to Shanghai was cleared of Taipings, whose rule was now confined to that part which lies to the westward of the canal, having Nankin on the north, and Hangchow on the south. Both these cities were being besieged in a leisurely manner by the Imperialist forces, but the country between them was in complete possession of the rebels, who had utterly devastated it. Gordon now proposed to penetrate through the centre of the district, securing all the strong points as he advanced. In this manner he would cut the enemy's forces in two, and prevent all connection between them. There were many difficulties attending this course of action. Hitherto, whilst manœuvring on the east side of the canal, he had been able to bring up his supplies, both of ammunition and provisions, from the numerous friendly posts which he had established. Once he passed over to the western side he would have to convey everything with him, as the country was so completely laid waste that he could not trust to obtaining the slightest assistance locally.

Undeterred by these difficulties, having collected all his resources at Soochow, he moved northward to Wusieh, and thence made a dash upon Yesing and Liyang, both of which he easily secured. Thence he advanced northwards on Kintang, where he met with the first serious disaster to his arms. Not only was he

baffled and driven back in his assault on the town, but himself received a bullet in the leg, a disaster of almost more importance to the cause than the loss of an action. Even when wounded he refused to quit the field, but stood giving orders until he all but fainted from loss of blood. Dr. Moffat had to carry him to his boat by main force. At this critical juncture he received most disturbing intelligence as to what was passing in his rear. He had trusted the security of his flank to the Imperialists under Ching, but in his absence the Taipings had been permitted once more to advance in force on the district that had been cleared of their presence, and had actually repossessed themselves of Fushan, the first of Gordon's acquisitions. Stretched in a line from Chanchanfu, Waisso, and Fushan, they were threatening to swoop down once more on the whole province from Soochow to Shanghai.

Gordon had to act, and that promptly, and yet he was at the moment severely wounded. Fortunately the transport was entirely by water, and lying on the deck of his boat he was able to give his orders and supervise their execution. The troops that had accompanied him to Kintang had been too much demoralized by their defeat to be available for further operations. Leaving them at Liyang, he took with him the small force that he had stationed there, about 1,000 strong, and with them returned to Wusieh. Having studied the position of affairs, he determined to secure Waisso, by means of which he would penetrate the centre of the Taiping line. After several mishaps, owing to the mismanagement of his subordinates, he at last succeeded in driving out the rebels, and in conjunction with the Imperialists he also captured Chanchanfu. This was only effected after a most stubborn resistance, the garrison consisting of 20,000 men, of whom 1,500 fell in the defence. This was the last battle fought by the Ever Victorious Army under Gordon's leadership. The Taipings were crushed; Hangchow in the south had fallen, and the shattered remnants of that once formidable rebellion were sheltering themselves behind the walls of Nanking, the capture of which was only a question of time. Gordon marched his force back to Quinsan, and made all his arrangements for its being disbanded. During the sixteen months that he had been at its head it had taken four cities and a dozen other strong places, had fought many battles, and had killed and wounded about fifteen times its own number.

Again, Gordon was offered a large money present, and again he declined it. As he wrote to his friends at home, "I leave China as poor as when I entered it." The Emperor, however, was determined to honour him to the utmost extent, and published a decree in which, after enumerating all the victories

which Gordon had gained in command of his "Ever Victorious Force," he continues:—

"We command that Gordon be rewarded with a yellow riding jacket, to be worn on his person, and a peacock's feather, to be carried on his cap; also, that there be bestowed on him four suits of the uniform proper to his rank of Ti-Tu, in token of our favour and desire to do him honour."

The rank of Ti-Tu was the highest in the Chinese army, and the Yellow Jacket and Peacock's Feather are distinctions only bestowed on merit of the very highest class.

The merchants of Shanghai presented him with an address, from which the following extracts are of interest:—

"Your career during the last two years of your residence in the East has been, so far as we know, without a parallel in the history of the intercourse of foreign nations with China." . . . . "In a position of unequalled difficulty, and surrounded by complications of every possible nature, you have succeeded in offering to the eyes of the Chinese nation, no less by your loyal and throughout disinterested line of action, than by your conspicuous gallantry and talent for organization and command, the example of a foreign officer serving the Government of this country with honourable fidelity and undeviating self-respect." . . . .

But perhaps the most striking testimony of the admiration he excited is from the pen of a Taiping chief, and what he writes may perhaps furnish a key to the mystery of Gordon's having passed through so many hard-fought actions, and having only once been wounded:—

"Often have I seen the deadly musket struck from the hand of a dastardly Englishman, tempted by love of loot to join our ranks, when he attempted from his place of safety to kill Gordon, who ever rashly exposed himself. This has been the act of a chief—yea, of the Shield King himself."

What a grand character must that have been which could have elicited such a spark of chivalry in the merciless breast of a Taiping leader!

Gordon returned to England at the beginning of 1865, having been gazetted to a Brevet Lieutenant-Colonelcy. He was also made a C.B. With these honours he found himself stationed at Gravesend. Forbes, in his "Life of Gordon," takes exception to Chesney's sarcasm, as to his being employed in "the building of obscure forts, from the designs of others, on an Essex swamp," and says that "the defence of the kernel of the Empire was confided to his charge." This is blatant nonsense, the truth being very much what Chesney wrote. The man whose name was ringing

throughout Europe for the doughty deeds which had won him the honourable prefix of Chinese Gordon, who in any other army but ours would have been marked out for high command, was placed at Gravesend, in a comparatively subordinate post, where his most important duty was the superintendence of the erection (not the designing) of the forts intended for the defence of the Thames. In this lowly position he remained contentedly fulfilling the routine of his duties with a modesty and an absence of all display which only reflects the more lustre on his fame. Here it was, too, that he exhibited another phase of his many-sided character. He had shown himself the leader of turbulent and undisciplined barbarians; he had not hesitated to sacrifice life when he thought it his duty, either in the suppression of mutiny, or in the pushing forward of an assault. He could look on unmoved, whilst those around him fell fast in unquestioning obedience to his mandate, and yet there was all the time within his breast the most tender sympathy for suffering, and a yearning desire for its alleviation. At Gravesend this beautiful side of his character came to the front, and during the six years that he was stationed there he lived a life of doing good, stinting himself of almost the necessaries of life in order that with a free hand he might have the wherewithal to relieve the wants of all who sought his help. It was especially to the young that he devoted himself with the most loving assiduity. As Hake says :—

"He always took a great delight in children, but especially in boys employed on the river or the sea. Many he rescued from the gutter, cleansed them and clothed them, and kept them for weeks in his house. For their benefit he established evening classes over which he himself presided, reading to and teaching the lads with as much ardour as if he were leading them to victory. He called them his 'kings,' and for many of them he got berths on board ship. One day a friend asked him why there were so many pins stuck into the map of the world over his mantelpiece; he was told that they marked and followed the course of the boys on their voyages, that they were moved from point to point as his youngsters advanced, and that he prayed for them as they went day by day. The light in which he was held by these lads was shown by inscriptions in chalk on the fences. A favourite legend was, 'God bless the Kernel.'"

Of the numerous decorations that had been bestowed on him, there was but one that he prized, and this was a gold medal given him by the Empress of China, with a special inscription on it that pleased him much. Suddenly this medal disappeared, and it was only long afterwards discovered that he had erased the inscription and then sent the medal (which was valuable from the weight of gold)

anonymously to Canon Miller for the relief of the sufferers in the cotton famine at Manchester.

After a peaceful sojourn of six years at this humble station, a period to which he afterwards always looked back as the happiest time of his life, he was in 1871 appointed the British Member of the European Commission of the Danube, with an annual salary of £2,000. Years have passed since he left Gravesend, but he is still tenderly remembered there, and the good that he did is proudly dwelt on by all who then knew him.

His work at Galatz was the improvement of the Sulina mouth of the Danube, and this he performed so effectually that vessels of large burden can now load at the Galatz and Braila wharfs. Forbes says:—

"I found his memory still green there in the early years of the Russo-Turkish War, fourteen years after he had exchanged the mosquitoes of the Lower Danube for the not less numerous insects of the Upper Nile."

The Egyptian Government had for some years past been endeavouring, with more or less sincerity, to suppress the slave trade which had developed itself in the Upper Nile basin, the consequence of the attempt made by Mehemet Ali to introduce commerce and civilization amongst its savage tribes by means of trading ports. It had soon been found that no trade paid so well as that in slaves; slave-hunting had therefore become the profession of a number of unscrupulous men, chief amongst whom was Zebehr, whose name afterwards was brought so prominently forward in connection with Gordon. The Khedive, alarmed at the extent to which this abominable traffic had grown, and at the ill repute brought in consequence on the Egyptian Government, annexed the whole Nile basin up to the Equatorial Lakes, and in 1869 appointed Sir Samuel Baker supreme ruler over the country south of Gondokoro. Of Baker's work in this region there is no need here to speak, but he undoubtedly did really good service. As his term of government was to expire in 1873, it behoved the Khedive to secure a fitting successor to complete the work. Nubar Pasha, having met Gordon at Constantinople whilst engaged on the Danube Commission, asked him to recommend an Engineer officer for the post shortly to be vacated, and Gordon volunteered his own services, should the Khedive apply for him and the British Government consent.

This having been done and sanction obtained, Gordon arrived in Cairo in February, 1874. The Khedive proposed to give him a salary of £10,000 a year, but he declined to accept anything beyond what had been his salary as a Danubian Commissioner, viz., £2,000. Dr. Birkbeck Hall, in his book on Central Africa, gives

an abstract of the Khedive's instructions to Gordon, from which the following is taken:—

"The province which Colonel Gordon has undertaken to organise and to govern is but little known. Up to the last few years it has been in the hands of adventurers, who had thought of nothing but their own lawless gains, and who had traded in ivory and in slaves. They established factories and governed them with armed men. The neighbouring tribes were forced to traffic with them whether they liked it or not. The Egyptian Government, in the hope of putting an end to this inhuman trade, had taken the factories into their own hands, paying the owners an indemnification. Some of these men had nevertheless been still allowed to carry on trade in the district, under a promise that they would not deal in slaves. They had been placed under the control of the Governor of the Soudan. His authority, however, had scarcely been able to make itself felt in these remote countries. The Khedive, therefore, had resolved to form them into a separate Government, and to claim, as a monopoly of the State, the whole of the trade with the outside world. There was no other way of putting an end to the slave trade, which at present was carried on in defiance of law. Once the brigandage had been stamped out, trade might become free to all."

Gordon was not long in discovering that much of the apparent desire on the part of the Egyptian Government for the suppression of the slave trade was very hollow, and that there were those at the head of affairs whose interests were linked in the success of the traffic.

"I think," he wrote, "I can see the true motive of the expedition, and believe it to be a sham to catch the attention of the English people, and feel like a Gordon who had been humbugged."

He, however, determined to carry out his instructions, and as far as in him lay to make his expedition a success, thus baffling the wiles of those who sought to make a tool of him. The position he was to occupy was that of Governor of the Equatorial Provinces, in which capacity he was more or less under the control of the Governor-General of the Soudan, whose head-quarters were at Khartoum. Gondokoro was the nominal capital of his own province and his title, "His Excellency General Colonel Gordon, the Governor-General of the Equator." He pushed forward as rapidly as possible, *viâ* Suakin and Berber, to Khartoum, where he was received by the Governor with great honour. There is not space in this sketch to follow completely the steps of his progress during the three years in which he was occupied in the organization of his province and the suppression of the slave trade, which had taken such firm hold within its limits. A full detail of all that he did in this eventful period is given in Dr. Birkbeck

Hall's interesting work; only a point here and there can be touched on.

On arrival at Gondokoro he found that the province, over which he was the nominal governor, in no way acknowledged the sway of the Khedive, and that with the exception of two small posts, one at Gondokoro and the other at Fatiko, 200 miles farther south, Egyptian rule was a myth. He was in no way dismayed at this aspect of affairs:—

"I apprehend not the least difficulty in the work; the greatest will be to regain the poor people's confidence, they have been hardly treated."

His Staff consisted of Major Campbell, of the Egyptian Staff, Kemp, the two brothers Linant, Anson, Russell, and an Italian named Gessi; eventually two Engineer subalterns, Chippendall and Watson, also joined him. He was not long at his new post before he succeeded in giving the first check to the slave trade. There were three slave stations above him on the Bahr Gazelle, which he promptly cleared out, capturing the slaves and cattle that had been seized from the natives. He was ill served; the few troops he had to depend on were untrustworthy, his Staff soon broke down with illness, several of them dying, and the officials who should have aided him in his task were hand-in-glove with the slave dealers. Nothing daunted, he persevered in his design, penetrating in all directions to points where he was least expected, dashing now here, now there, and always inflicting condign punishment upon the offenders he discovered. Before long he had established a wholesome terror in the breasts of all evil-doers, and under the name of the Little Khedive, by which he became known, gradually worked a wonderful improvement.

What he had achieved before he had been a year in the district is thus recorded by a member of his Staff:—

"He has certainly done wonders since his stay in this country. When he arrived, only ten months ago, he found a few hundred soldiers in Gondokoro, who dare not go a hundred yards from that place except when armed and in bands, on account of the hostile Baris. With these troops Gordon has garrisoned eight stations—Sambat, Ratachambe, Bohr, Lado, Rageef, Fatiko, Duffli, and Makrane. Baker's expedition cost the Egyptian Government nearly £1,200,000; while Gordon has already sent up sufficient money to Cairo to pay for all the expenses of his expedition, including not only the sums required for last year, but the amount for the current one as well."

In carrying out this work Gordon knew well he was not acting as the authorities at Cairo wanted him to do:—

"I ask if his Highness would think me justified in hanging the men I find in charge of slaves. I do not think he would. I cannot help

thinking the Khedive finds out that he has made a mistake in appointing me, and that he would sooner have a quieter, easy-going, salary-drawing man."

Still he persevered, and the success he achieved was a gratifying result of the heroism and endurance of those three fateful years. It was whilst engaged in this work that Gordon became uncertain what he should do. In his quaint way he wrote :—

"Body of Comfort—a very strong gentleman—says, You are well, you have done enough, go home—go home, and be quiet, and risk no more. Mr. Reason says, What is the use of opening more country for such a Government? There is more now under their power than they will ever manage. Retire now, and avoid troubles with M'tesa and the Mission. But Mr. Somebody (I do not know what) says, Shut your eyes to what may happen in future; leave that to God, and do what you think will open the country thoroughly to both Lakes. Do this not for the Khedive, or for his Government; but do it blindly and in faith."

He remained at the seat of his government for three years, at the expiration of which time he decided on resignation, and started for Cairo, which he reached on December 2nd, 1876, and on Christmas Eve he was in London. Hake thus summarizes his three years' work :—

"He had mapped the White Nile from Khartoum to within a short distance of the Victoria Nyanza. He had given to the slave trade on the White Nile a deadly blow. He had restored confidence and peace among the tribes of the Nile valley, so that they now freely brought into the stations their beef, corn, and ivory for sale. He had opened up the water communication between Gondokoro and the Lakes. He had established satisfactory relations with King M'tesa. He had formed Government districts, and established secure posts, with safe communication between them. He had contributed a revenue to the Khedival exchequer, and this without oppression. The Tai-ping rebellion established Gordon's genius as a military commander. The Equatorial Provinces, when he left them, testified not less to his genius as a philanthropic and practical administrator."

Gordon had thrown up his Equatorial government because he had been so thwarted by Ismail Yacoub Pasha, the Governor-General of the Soudan, that he found it impossible to give the *coup de grâce* to the slave-driving system whilst it continued to be encouraged at Khartoum. He had not, however, been many days in England when he received a telegram from the Viceroy, appealing to him to return and complete his work. This Gordon decided on doing, provided he were made Governor-General over the entire Soudan, so as to be free to act without being fettered by others. The Khedive consented to his demand, and on February 17th, 1877, wrote him a letter, which commenced thus :—

"Appréciant l'honorabilité de votre caractère, votre energie, et les

grands services que vous avez déjà rendus à mon gouvernement j'ai décidé de réunir en un grand Gouvernement-Général, tout le Soudan, le Darfour, et les Provinces Equatoriales, et de vous confier la mission importante de le diriger. Je viens de rendre un décret à cet effet." . . . .

Armed with supreme authority, Gordon now undertook to return to the Soudan and complete the work he had so auspiciously begun. Before he could do this, however, the Khedive requested him to visit Abyssinia and endeavour to settle the imbroglio into which the Government had fallen with the king of that country. It will not be possible here to enter into the details of the matter, which was much complicated, partly by the disorganized state into which Abyssinia had been thrown by the British expedition, and the death of King Theodore, and partly by the greed of acquisition which had prompted the Khedive to annex provinces in that quarter to which he had no just claim. Gordon succeeded in temporizing, and having made the best arrangements possible under the circumstances, he pushed on for Khartoum, where he was installed in his new dignity. When the firman had been read an address was given by the Cadi and a salute fired. Gordon was expected to make a speech in reply, but all he said was, "With the help of God I will hold the balance level." This short and pithy speech was greeted with the loudest acclamations, and the people had already had sufficient experience of their new Governor to know that he meant what he said. He complained bitterly of the pomp which he was expected to maintain at Khartoum :—

"To his disgust he had to live in a palace as large as Marlborough House. Some two hundred servants and orderlies were in attendance, they added to his discomfort by obliging him to live according to the niceties of an inflexible code of etiquette. He was sternly forbidden to rise to receive a guest or to offer a chair ; if he rose every one else did the same ; he was guarded like an ingot of gold." He had made a similar complaint on his journey. "I can say truly, no man has ever been so forced into a high position as I have. How many I know to whom the incense would be the breath of their nostrils ! To me it is irksome beyond measure. Eight or ten men to help me off my camel ! as if I were an invalid. If I walk everyone gets off and walks ; so, furious I get on again." *

Gordon had no sooner grasped the reins of supreme power than he began that war *à outrance* against the slave-hunters, which in his former position he had not been able to carry on outside the limits of his own province. Now he could strike at the roots of the evil, and he did so with a vigour and a resolution that terrified

* Hake's "Story."

his enemies. For the three years of his government he waged an unceasing war against the system and those who had battened on it. What that war was and what were the difficulties to be encountered are well depicted by Hake :—

"The work he had begun and was bent on finishing was fraught with peculiar perils. It demanded a tact, an energy, and a force of will almost superhuman. He had to deal not only with worthless and often mutinous governors of provinces, but with wild and desperate tribesmen as well; he had to disband 6,000 Bashi-Bazouks who were used as frontier guards, but who winked at slave-hunting and robbed the tribes on their own account; he had to subdue and bring to order and rule the vast province of the Bahr Gazelle, but now beneath the sway of the great slaver Zebehr. It was a stupendous task to give peace to a country quick with war, to suppress slavery among a people to whom the trade in human flesh was life and honour and fortune, to make an army out of perhaps the worst material ever seen, to grow a flourishing trade and a fair revenue in the wildest anarchy in the world. The immensity of the undertaking, the infinity of details involved in a single step towards the end, the countless odds to be faced, the many pests—the deadly climate, the horrible vermin, the ghastly itch, the nightly and daily alternation of overpowering heat and bitter cold—to be endured and overcome, the environment of bestial savagery and ruthless fanaticism—all these combine to make the achievement unique in history."

His greatest antagonist was Sulieman, the son of Zebehr, who during his father's forced stay at Cairo led the slave-hunting against the Governor. The struggle was long and bitter, but Gordon was well served by the Italian Gessi, who proved an invaluable lieutenant. At last Sulieman and his force were crushed, himself shot, and a deadly blow struck at the evil.

In the midst of his work Gordon was summoned to Cairo to advise the Khedive on his financial difficulties. A worse man could not have been selected, under the circumstances. What the Khedive wanted was one who would prophesy smooth things, who would suggest schemes for tiding over difficulties without consideration of the fact that they would become steadily more and more formidable. Instead of this he found a stern economist, one who would use the knife unsparingly to remove the cancer of corruption that was feeding on the vitals of the State.

The consequence was what might have been anticipated. On arrival at Cairo he was received with every mark of distinction, he was made President of the Finance Inquiry, placed at His Highness's right hand at dinner, and lodged in a palace set apart for royalties; but, as he himself quaintly wrote :—

"I left Cairo" (at the end of the month) "with no honours, by the ordinary train, paying my fare. The sun which rose with such

splendour set in the deepest obscurity. His Highness was bored with me after my failure, and could not bear the sight of me." . . .

In the middle of 1879, he heard of the abdication of Ismail and the accession of Tewfik, and received orders to proclaim the new Khedive throughout his government. Ismail had, on the whole, supported Gordon in most of his work. He had an unbounded admiration for him, and although he found his directness and unswerving honesty at times irksome, would have deeply regretted a quarrel. "They say I do not trust Englishmen," he once remarked. "Do I mistrust Gordon Pasha? That is an honest man, an administrator, not a diplomatist." Tewfik, however, was different, and Gordon felt that he could no longer do good work under the new ruler. He therefore returned to Cairo to tender his resignation. Tewfik requested him to make a second visit to the Abyssinian King, and once more endeavour to settle matters with him. This he did. The embassy was not very successful. Gordon felt that any terms he might make with the King would, if unpalatable at Cairo, be thrown over. Moreover, the King himself was exorbitant in his demands, and Gordon did not hesitate to beard him, although he was at the time hopelessly in his power. His mode of dealing with the arrogant potentate is thus given by Hake:—

"The King received him sitting on his throne, or whatever piece of furniture did duty for that exalted seat, a chair being placed for Gordon considerably lower than the seat in which the King sat. The first thing the Pasha did was to seize this chair, place it alongside that of his Majesty, and sit down on it." . . . "'Do you know, Gordon Pasha, that I could kill you on the spot if I liked?' 'I am perfectly well aware of it, your Majesty,' said the Pasha; 'do so at once, if it is your royal pleasure. I am ready.'" . . . "'I am always ready to die, and far from fearing your putting me to death, you would confer a favour on me by so doing, for you would be doing for me that which I am precluded by my religious scruples from doing for myself." . . . "Then my power has no terrors for you?" 'None whatever,' was the Pasha's laconic reply. His Majesty, it is needless to add, instantly collapsed."

On his return from Massowah he definitely resigned office, and returned to England in the beginning of January, 1880, from whence he almost immediately proceeded to Lausanne. Whilst there he received an offer from the Cape Government to take command of the Colonial forces at a salary of £1,500, to which he replied:—"Thanks for telegram just received. I do not feel inclined to accept an appointment."

Early in May the public was startled by the news that the man who for the last three years had held despotic sway over the wide-

spread provinces of the Soudan had accepted the post of private secretary to Lord Ripon, then going out to India as Governor-General. They were equally amazed when, on the arrival of the Viceroy at Bombay, they heard of the resignation of the illustrious secretary. The whole truth of this matter is not likely ever to be known now. Gordon himself said:—

"In a moment of weakness I took the appointment of private secretary to Lord Ripon, and repented that I had done so at once, but I did not like to say so. I went out and saw at Bombay that, in my irresponsible position, I could not possibly hope to do anything really to the purpose in the face of vested interests out there. So seeing this was the case, and also observing that my views were diametrically opposed to those of the official classes, I gave up."

There is little doubt that the views here referred to were on the subject of Yakoob Khan, and our policy in Afghanistan. Lord Ripon had at first been disposed to concur in them, but after learning the opinions of the officials in India, he changed his mind. Be this as it may, Gordon resigned his post, and was once more a free man. Whilst still at Bombay he received the following telegram:—

"I am directed to invite you to Pekin. Please come and see for yourself. This opportunity for doing really useful work on a large scale ought not be lost. Work, position, conditions can all be arranged with yourself here to your satisfaction. Do take six months' leave and come."

To this he replied:—

"Inform Hart, Gordon will leave for Shanghai first opportunity; as for conditions, Gordon indifferent."

He, at the same time, applied to the Horse Guards for leave till the end of the year, telling them that he was asked to go to China. The military authorities declined to give the leave without more definite information, whereupon Gordon telegraphed, "Arrange retirement, commutation, or resignation of service," and without waiting for a reply started on his journey. When he reached Point de Galle, he found that the authorities had waived their objections, and that his leave was granted on the sole condition that he should take no military service in China. As he never had had any intention of doing so, he proceeded on his expedition without further obstacle. On arrival, he found the country on the eve of undertaking a war against Russia, and his old friend Governor Li in great difficulties. The party in power at Pekin were all for war, and he had been urged to raise the standard of rebellion and clear them away. Indeed, the Minister

of one European Power actually suggested to Gordon that he should himself march on Pekin, and depose the Emperor:—

"I told him," said Gordon, "I was equal to a good deal of filibustering, but that this was beyond me." *

He, however, went to Pekin and succeeded in persuading the Government to accept the Russian terms and avoid war. He told them—

"it was of no use, they could not go to war. The conversation was carried on through the medium of an interpreter, who got so frightened at the words used that he upset the cup of tea that was standing by him. At last he declared he would not repeat such expressions as Colonel Gordon made use of, so he (Gordon) took the dictionary, looked out 'idiotcy,' and pointed it out to them. 'I said, "Make peace," and wrote out the terms.'"†

After having given the best advice he could as to the organization of the Chinese army, he left the country and returned to England, which he reached in October, 1880.

In the spring of the following year he was appointed Commanding Royal Engineer at the Mauritius. According to the statement made by Sir H. Gordon in his book, this appointment was the result of an exchange with Sir H. Elphinstone, who had been ordered there, and contemplated retirement rather than take the post. Gordon, hearing of this, volunteered to go in his place. On March 24th, 1882, he was promoted Major-General, and in consequence vacated his command. Prior to this, however, the Cape Government had telegraphed to Lord Kimberley:—

"Ministers request me to inquire whether H.M.'s Government would permit them to obtain the services of Colonel Charles Gordon. Ministers desire to invite Colonel Gordon to come to this colony, for the purpose of consultation as to the best measures to be adopted, with reference to Basutoland in the event of Parliament sanctioning their proposals as to that territory, and to engage his services should he be willing to renew the offer made to their predecessors in April, 1881, to assist in terminating the war and administering Basutoland."

The offer here referred to had been made by Gordon, as follows:—

"Chinese Gordon offers his services for two years at £700 a year, to assist in terminating war and administering Basutoland."

It will be observed that the wording of this offer on his part was very different from that which had previously been made to him and declined, which was to command the Colonial forces, with

* "Events in the Life of Gordon," p. 148.
† *Ibid.* 149.

a salary of £1,500 a year. No reply had been received by him to his offer, and now when the Cape Government were in difficulties they bethought themselves of it, and applied for him.

Of course, Gordon went, but on arrival found the position quite different from what he expected, or from that specified in the telegram to Lord Kimberley. Mr. Orpen was the Administrator in Basutoland, and although the Government had no confidence in him, they feared the unpopularity of his removal. They therefore renewed to Gordon the original offer of the appointment of Commandant of the Forces which he had previously declined, and he, anxious to be of service, accepted it. Unquestionably this was an error, as he speedily found. The Government tried to make use of him in the Basuto question, and compromised him very seriously. He had been requested to visit Masupha, one of the Basuto chiefs, with a view to try and win him over, at the time when they were urging Letsea, a rival chief, to attack Masupha. The consequence was, that Gordon ran the greatest possible risk, and had not Masupha recognized his complete innocence of all complicity it would have gone hard with him. He no sooner returned to head-quarters than he sent in his resignation and shook the dust of the Cape from off his feet, arriving in England on November 8th, 1882.

Gordon had been for some years in communication with the King of the Belgians with a view to establishing posts in Africa under an international flag, for the promotion of commerce and the civilization of the wild tribes. Now that he had returned from the Cape the King revived the subject:—

"If you could enter my service we will examine the question together, and I have no doubt but that with perseverance we shall solve the problem. I now again request you, as you are at liberty, to enter my service. For the moment I have no mission to give you, but I wish much to have you at my disposal and to take you from this moment as my counsellor. You can name your own terms, you know the consideration that I have for your great qualities, and you cannot doubt the extreme pleasure I should always have in bearing witness to it. I shall be delighted to receive verbally or in writing a favourable answer. The cause which I hope to make succeed in Africa is that for which you have already done so much."

To this Gordon replied that he was prepared to enter His Majesty's service at any time he might require him, on the understanding that the sphere of employment should be the Congo. Pending further notice he proceeded to Palestine, where he devoted himself to the study of biblical geography and archæology. Whilst deeply engaged, in this to him most absorbing occupation, he received a telegram, in the middle of October, 1883, announcing that

the King of the Belgians claimed his services, according to promise, for work on the Congo. He at once applied for sanction to the War Office, who required to know on what he was to be engaged. This was defined as being placed at the head of all that was going on in connection with the opening up of the Congo. The War Office, after some debate, sent him the following telegram:—

"The Secretary of State has declined to sanction your employment on the Congo."

In transmission the word "declined" was changed to "decided." Gordon therefore, imagining that he had received official sanction, replied to the King that he would be home in December. As a matter of fact he reached Brussels on New Year's Day of 1884. Here he made all his arrangements with the King. He soon discovered the error of the telegram, and found that he had not received permission to undertake the Congo appointment. It was therefore decided by the King that he should resign his Commission, receiving compensation from Belgian sources. He wrote to Mr. Stanley to inform him that he would leave Lisbon *en route* for the Congo on February 5th. He then returned to England, and on January 7th wrote to the Military Secretary requesting him—

"to forward to His Royal Highness, the Field Marshal Commanding-in-Chief for the gracious approval of Her Majesty the Queen, this my humble petition to be allowed to retire from Her Majesty's service."

On January 8th he had his celebrated interview with the Editor of the "Pall Mall Gazette," on the subject of the Soudan, which lasted for two hours, and the result of which appeared in that paper on the following day. There can be no doubt that to this publication was owing that change in his destination which led to his death.

He showed such a masterly grasp of the situation in Egypt, such an intimate knowledge of the inner springs of action which were moving the Soudanese and their Mahdi, that public opinion forced the hand of the Government. So far from accepting his resignation, they were compelled to recal him from Brussels, whither he had returned on January 16th. Sir Henry Gordon thus narrates what took place—

"Nothing further transpired until the morning of the 18th, when his brother received a communication from him dated the 17th, written in the highest spirits. 'General Gordon directs that his uniform may be got ready.' . . . . He adds, 'I saw King Leopold to-day, he is furious.' . . This letter was a puzzle, General Gordon would not require his uniform on the Congo, in fact he had requested it might be sold. However, the articles were all ordered, when, on Sir H. Gordon's return home at 5 p.m., he found a couple of notes, one written at 10 a.m.,

saying General Gordon was at Knightsbridge Barracks with Capt. Brocklehurst. On meeting General Gordon he was in a delightful mood—all cares, if he ever had any, had disappeared, and on being asked what it all meant, he replied: 'I am off to the Soudan!' 'When?' 'To-night.' And so he started without kit of any kind, his uniform alone excepted."

Mr. Gladstone, in the House of Commons, thus defined what he considered Gordon's mission to be:—

"General Gordon went not for the purpose of reconquering the Soudan—the Sultans, at the head of their troops—to submit themselves to the Egyptian Government. He went for no such purpose as that. He went for the double purpose of evacuating the country by extricating the Egyptian garrisons, and reconstructing it by giving back to the Sultans their ancestral powers, withdrawn or suspended during the period of Egyptian occupation. General Gordon has in view the withdrawal from the country of no less than 29,000 persons under military service in Egypt, and the House will see how vast was the trust which was placed in the hands of this remarkable person. We cannot exaggerate the importance we attach to his mission."

Gordon himself thus defined it:—

"I go to cut the dog's tail off. I've got my orders, and I'll do it, *coûte que coûte*."

He started from Charing Cross at eight o'clock that night; Lord Wolseley carried his portmanteau, Lord Granville took his ticket, whilst the Duke of Cambridge held open the carriage door. Truly, poor Gordon was being royally treated after so many years of neglect and thwarting, and how utterly did he despise all this popular enthusiasm. He was accompanied by Lieutenant-Colonel Stewart, of the 11th Hussars. They arrived at Cairo on January 25th, and left for Berber and Khartoum on the 27th, Gordon bearing with him the double commission of British High Commissioner, and Governor-General of the Soudan on behalf of the Khedive. They were accompanied by the son of the Sultan of Darfour. Sir Gerald Graham also went with them as far as Assouan. On reaching Korosko they left the Nile and crossed the Nubian Desert to Abou Hamed, a ride of 240 miles on camels, without escort, through an enemy's country. They reached Berber on February 11th. Here Gordon began his arrangements for carrying out the new policy, and was everywhere received with acclamation. It was not, however, till he entered Khartoum, on the morning of February 18th, that his triumph culminated. There he was greeted as the benefactor of the people; they thronged around him, kissing his hands and his feet, and hailing him as Sultan, Father and Saviour.

It is very evident that the British Ministers, when they sent General Gordon on his mission, considered that he would have nothing to do but to set up a local government out of whatever materials he might find at hand, and without much reference to what that government might be. He was then to bring in the various garrisons, and abandon the territory for good. The matter was not so simple as they imagined. There was no power available to replace that of the Khedive, and there was the Madhi gradually increasing in strength and threatening all the posts where Egyptian troops were still stationed. Even at Khartoum, which had not as yet been besieged, Gordon reported, on February 27th :—

"Two-thirds of the people are terrorized over by one-third. In the place of supporting the two-thirds our undisguised intention is to get the Egyptian *employés* out of the Soudan. To this the two-thirds strongly object, for it leaves them impotent. . . . The evacuation of the Soudan is impossible until the Government asserts its authority. I mean by evacuation the removal of all Egyptian *employés* who form the machinery of the Government."

He, however, at once set about sending down the river batches of sick and wounded, women and children. Colonel Duncan, who was sent to Korosko to receive the refugees, spoke most highly of the promptitude and business-like manner in which the work was done. In this way 2,500 were rescued.

Then came the siege. On March 12th the Madhi's forces closed in, and no more withdrawals were possible. Gordon was then hemmed in, with only two other Englishmen, Stewart and Power, the latter acting as correspondent for the "Times." Of course he could at any moment have got away himself, as could either of his two companions, but he wrote :—

"It would be the climax of meanness, after I had borrowed money from the people here, had called on them to sell their grain at a low price, &c., to go and abandon them without using every effort to relieve them ;" and again, "Retreat is impossible unless we abandon the civil *employés* and their families."

Having thus decided to cast in his lot with his people, he set to work to carry out the defence of the town, and adopted the most vigorous measures for that purpose. In this he was ably seconded by Stewart and Power, and he had instilled such a feeling of confidence into his troops and the townspeople generally, that he was able to bid defiance to the hordes of the Mahdi. He provided the steamers, of which he had seven, with bullet-proof plating, and rendered them capable of running the gauntlet of the enemy's fire without damage. He arranged a system of small mines in front

of his works, which prevented the enemy from attacking him. In one of his letters to Sir E. Baring he writes :—

"Thanks to our mines, I do not fear for this place." . . . . "We are making all preparations, and laying down mines in river. I think we shall hold out all right."

This was at the end of April. From that time on he never relaxed in the vigour of his defence, and encouraged his garrison by the promise of early relief. Month after month, however, passed on, and no steps were taken. Those who were the best judges felt that if the heroic leader were not to be left to his fate prompt measures were necessary. In July Lord Wolseley urged in the strongest manner that a small brigade of between three and four thousand British troops should be pushed on to Dongola, from which point help could be sent forward as might be deemed necessary. He concluded with the prophetic words—

"I don't wish to share the responsibility of leaving Charley Gordon to his fate, and it is for this reason that I recommend immediate and active preparation for operations *that may be forced upon us by-and-by.*"

Nothing, however, was done. Week after week of most precious time was wasted, until at length the Government were forced into action by the pressure of public opinion. It was now, however, too late. The story of the relief expedition is well known. How the troops worked their way up the river, in spite of difficulties and dangers, over cataracts and every species of obstacle, as far as Dongola. How then, feeling the preciousness of time, the force was divided into two parts, one continuing by the river route, towards Berber, whilst the other and smaller force crossed the desert from Debbeh to Metemmeh. How they fought two severe actions by the way, in the last of which their gallant leader, Sir Herbert Stewart, lost his life. How Sir Charles Wilson succeeded to the command, met the steamers Gordon had sent down waiting for him at Metemmeh. How he went up to Khartoum, only to find the place in the hands of the enemy, and the man dead for whom so much effort had been made, and so many sacrifices endured. This has been told in the narrative of the war in Egypt, and but little need here be said about it. That Gordon felt, with much natural bitterness, the way in which he had been first made use of, and then abandoned to his fate, his own few words show; but no one can tell the thoughts that must have arisen in his mind as day after day was spent in solitude in the deserted palace of Khartoum. His English comrades had been sent away by him some time previously, only to meet their death by treachery on the way down to Dongola, and the hero was left alone. We get a few sad glimpses of him before the

blow fell. Thus, on December 14th, he wrote to his friend, Colonel Watson, R.E., who had been with him in the Soudan in 1874:—

"I think the game is up, and send Mrs. Watson, yourself, and Graham my adieux. We may expect a catastrophe in the town in or after ten days. This would not have happened (if it does happen) if our people had taken better precautions as to informing us of their movements; but this is spilt milk. Good bye."

Then again, we have that last touching postscript:—

"I am quite happy, thank God, and, like Lawrence, I have *tried* to do my duty."

The exact details of the end are not yet known, nor is it now probable that they ever will be. Colonel Kitchener, R.E., compiled, from the most trustworthy sources at his command, a narrative of as much as could be gleaned. In this he says:—

"In my opinion Khartoum fell from sudden assault, when the garrison was too exhausted by privation to make proper resistance." . . . . "It is difficult, from the confused accounts, to make out exactly how General Gordon was killed. All the evidence tends to prove it happened at or near the palace, where his body was subsequently seen by several witnesses." . . . . "The only account by a person claiming to be an eyewitness of the scene of General Gordon's death relates: 'On hearing the noise I got my master's donkey, and went with him to the palace. We met Gordon Pasha at the outer door of the palace. Muhamed Bey, Mustapha, with my master, Ibrahim Bey, Rushdi, and about twenty cavasses, then went with Gordon towards the house of the Austrian Consul, Hansall, near the church, when we met some rebels in an open place near the outer gate of the palace. Gordon Pasha was walking in front, leading the party. The rebels fired a volley, and Gordon was killed at once.'" . . . . "One apparently reliable witness relates that he saw the rebels cut off Gordon's head at the palace gate after the town was in their hands."

Colonel Kitchener concludes by saying:—

"The memorable siege of Khartoum lasted 317 days, and it is not too much to say that such a noble resistance was due to the indomitable resolution and resource of one Englishman. Never was a garrison so nearly rescued; never was a commander so sincerely lamented."

Thus, in the early morning of January 26th, 1885, passed away one of the noblest spirits that the century has produced. The Royal Engineers have not been wanting in men to shed lustre upon their Corps. The lives of many such have been sketched in this work, but none have reached the high standard attained by Charles George Gordon. When the perspective of time shall have given to each his due proportion, the grandeur of character, the nobility of mind, the fervent religion, and the marvellous

abnegation of self, which form the leading features of the life of Gordon will place him on a pinnacle above even the noblest of his comrades.

This sketch may fitly be concluded with the following quotation from the eloquent address given by the Dean of Rochester, on the occasion of unveiling the memorial windows in the Cathedral, on August 9th, 1888:—

"When you get a man trying to do his duty, in its full completeness—his duty to his country, to his God, and to his soul—then you see the emancipation of manhood from slavery. You have the enthronement of faith, you have a vision, as it were, even here as in Paradise Lost, of a man in native honour clad—nay, it is not a vision, it is to be seen in the man renewed in the image of his Maker; it is to be seen in the man who will take the privileges that God gives him, and use them to his best; it is to be seen, it was seen, in him whose name has been honoured, and whose memory will be revered whenever we look upon that offering. It is to be found in him whose name will glorify the annals of our land as long as England has a history—Gordon the soldier—Gordon the martyr, Gordon the saint. His praise is sung by loftier hearts than mine—I cannot express, if I would, the honour and the love which I feel towards him; I will speak the worthier words of one who was his friend and his comrade."* 'Courage with him,' he says, 'was instinct intensified by faith and by a belief in another life. This life had no intense pleasures for him, he turned away from the applause of men. He accepted what came to his hand, and did it with the loyalty of a true gentleman, and yet more as a servant of Christ. He seemed to look on the world as a prison-house, in the precincts of which lay the new Jerusalem; and his waking thoughts, and even his dreams never wandered from it. While he was here, he did his best. Courage in him was not mere instinct, he had actually no fear. Danger presented nothing terrible to him, and death was an open gate through which he was to escape to a happier place. Whether he met death in action or whether he met it in other circumstances, it was nothing to him; death was to liberate him from the paltriness of human life. When! oh, when!' said his mourning friend, 'shall we see the like again?' There is another question for you and me to answer to-day, How did Gordon and where did Gordon obtain this marvellous power? He tells us again and again; from prayer, from study of the Word of God, from deeds of kindness, and, above all, from communion with his Saviour in the Sacrament of His Body and Blood."

* Lord Wolseley.

Colonel Sir JOHN BATEMAN CHAMPAIN, K.C.M.G.,

obtained his commission in the Bengal Engineers in 1853, and in the following year proceeded to India. After a short ordinary service he was appointed Assistant-Principal of the Thomason College at Rurki, a post which on the outbreak of the Mutiny he threw up to rejoin his Corps. As regimental Adjutant he was present at the actions on the Hindun river and the capture of the heights before Delhi. During the siege he took his full share of general work in addition to his duties as Adjutant. One of the batteries was named after him by order of the Chief Engineer. He was wounded by a grape shot on September 13th, but at the assault he volunteered for duty, although very lame, and was present at the capture of the palace. Writing on the following day, he stated :—

"Our men did not kill a single man who was not a sepoy, that I could see, and I am glad to say not a woman or child was touched."

He commanded the Bengal Sappers during many of the subsequent minor expeditions, and also during the march to Cawnpore and the Alumbagh.

At the capture of Lucknow he resumed the adjutancy, and served with Sir James Outram. During the operations by which the city was taken he twice acted as orderly officer to Sir Robert Napier, the Chief Engineer, by whom he was specially thanked for having, with Captain Medley and 100 Sappers, held an advanced post during the whole night. He served throughout the remainder of the war, and subsequently became Executive officer at Lucknow, where in the beginning of 1862 he received an offer to join Major Patrick Stewart's party employed on the Indo-European Telegraph. On this occasion he wrote as follows :—

"I am the happiest man in India to-day, I believe. Here is a telegram I received two days ago from Colonel Yule. 'Lord Canning desires me to ask if you are willing to accompany Major Patrick Stewart to Persia on telegraph business. Say by telegram if you accept. Understand it is left to your choice.' You needn't doubt what answer I gave, and I am now the envy of Lucknow."

Champain worked under Stewart, as his principal assistant, throughout the tedious negotiations which preceded the construction of the Persian telegraphs, and afterwards during the erection of them. On the death of Colonel Stewart in 1865, Major Champain

was appointed to the vacant post of General Assistant to Sir Frederick Goldsmid. At this time he wrote from Teheran:—

"You will see in my epistle to Ryde, that I am off to Constantinople at once, to take my dear lost friend's place. . . . . A real triumph came yesterday. You remember, perhaps, that the great objection to our last telegraph agreement with the Persians was that we were only to remain five months after the through line was open. I tried hard for seven months, and then for six, but had to agree for five, the Telegraph Prince and his secretaries being our great opposers. They were jealous of us, and anxious to get the complete management. Yesterday, the Sertip came to me and, after a lot of flattering palaver, asked when our five months were to begin. I replied, in about ten days. He then said, 'Shall you really leave Persia when the time has passed?' 'Certainly,' was my answer. He said, 'Could you be induced to leave all the English staff here if the King desired it?' I pretended to be doubtful, and replied that that was precisely what we wished when the agreement was first drawn up, and that personally I should rejoice in such an arrangement, but that I couldn't speak as to the views of the English Government. He then confessed to me that the Prince and he had been racking their brains as to what they should do if we really left. He allowed that our management surprised the Persians, that their receipts even now were very great from the line, and that the Prince was horrified at the idea of all breaking down when we went, and at the correspondent anger of the King. He added that the Prince himself had actually written to his Majesty asking him to try and prolong our stay for at least a year. Imagine my triumph! . . . . I leave for Constantinople on Monday. Oh, that Stewart had survived to see our grand difficulties over!"

From 1865 till 1870 Champain was associated with Sir Frederick Goldsmid in the general direction of the whole scheme, which was still far short of accomplishment. For some years their efforts were concentrated in Turkey, where Champain spent great part of the year 1866 in trying to get the Baghdad line into a state of efficiency. In the following year he was sent to St. Petersburg to negotiate for a special wire through Russia to join the Persian system. He was very graciously received by the Emperor in private audience, and evidently made a most favourable impression on the monarch, as he was invited by His Majesty to accompany the Court to Moscow. No practical results, however, came of the mission at the time.

In 1870 Sir Frederick Goldsmid resigned his post, and Champain assumed sole charge of what had become the "Indo-European Government Telegraph Department." A second cable being about to be laid in the Persian Gulf, Champain started for India to superintend the operation. On the way he had a narrow escape

from shipwreck. He described the event in a very graphic letter, from which the following extracts may be quoted :—

. . . "We have had a most disastrous voyage, and this time yesterday I was some fathoms below the surface of the Red Sea with little prospect of ever coming up again. . . . We left Suez on Sunday morning at ten, in the good ship *Carnatic*. At 1 a.m. on Monday morning she ran aground, going 11 knots, on a coral reef. . . . Pottering went on till eleven (Tuesday). . . The boats were then alongside. Our only women, (3) and one child were handed in, and perhaps two or three men, when smash, crash, went the vessel in the middle. I was shot with lightning force, with dozens of other men and at least 300 boxes, a heavy gun, and sundry other unpleasant articles, down a slippery deck at an angle of about 80°. We were plunged into a boiling whirlpool, and went under to any depth. I was as cool as I am now, though fearfully bumped with the luggage. I knew I must come up some time, and I kept my breath well. After an immense time, as it seemed, I was shot up by the whirlpool, and was just going to take breath when two men pulled me under. I kicked them off and came up again, when a third man seized my legs. Down I went, and he let go, but I was nearly done ; I thought of the dear ones at home, and gurgled a prayer, but I came up again. Then another man seized me by the neck and I saw it was Johnson. I gasped out to him that we were all right if he would only let go, as we were close to a mast, which was then about the only part of the wreck above water. He instantly understood and dropped me. I got on the mast and pulled him up and took five minutes to breathe, then I went down and got hold of Taylor, and dragged him out almost drowned."

In the end they were taken off by the *Sarmatia*, and Champain eventually reached his destination and carried out the object for which his voyage had been taken.

He was representative of the Indian Government at several International Telegraphic Conferences, and owing to his tact, power of expressing himself, whether verbally or in writing, and great sagacity, he was very successful in obtaining support to his views. During the Berlin Conference of 1885 he wrote a private letter, which illustrates this gift :—

" I have been curiously successful so far, and have, after really severe fighting, carried everything I cared for. Germany fought me on the Rectificatory question. First they got 14 to 4 against me in Committee. I appealed to Conference. The question was re-opened and sent back to Committee. Voting 10 to 8 against me. Yesterday it was 14 *for me* and 4 abstentions ! Triumph of obstinacy ! In the other matters, the only ones I cared for, I have also won, and am cock-a-hoop to-day."

Special questions frequently arose, the discussion and settlement

of which took him to many of the European capitals, whilst in the ordinary course of his duties he made repeated visits to India and Persia. In the great famine which overtook the latter country in 1871-72 he bore an active part in the measures for its relief, being secretary to the Mansion House fund. On this point he wrote from Gulhek in September, 1872 :—

"I am glad to say that there are no two opinions about the good done by our collection. It seems to have been excellently managed, and thousands and thousands who would have starved were maintained by us all over the country. The example too was not lost, and the richer Persians were forced to do something."

His last voyage eastward was taken in the autumn of 1885 for the purpose of supervising the laying a third cable between Bushire and Jashk; and on his homeward journey he learnt the news that he had received the honour of the K.C.M.G. His health, which had never been good, broke down after this, and he suffered much from asthma and bronchitis. He died at San Remo on February 1st, 1887, having too late sought the benefit of a softer climate than England.

He was a member of the Council of the Royal Geographical Society, as also of the Society of Telegraph Engineers, of which he was President in 1879. On the intelligence of his death reaching Persia, the Shah sent the following telegraphic message to Lady Bateman Champain :—

"Par ordre de Sa Majesté Impériale, mon auguste maître, je viens vous exprimer ses vifs regrets en apprenant la perte douloureuse que vous avez faite dans la personne estimée de Monsieur Champain, qui a laissé tant de souvenirs ineffaçables en Perse.—Le Ministre des Affaires Etrangères, YAHIA."

The above sketch has been abbreviated from an obituary memoir drawn up by Sir R. Murdoch Smith, who, better than anyone else, knew the greatness of the character and abilities of his lost chief.

COLONEL ROBERT HOME, C.B.,

obtained his commission in the Royal Engineers in 1856, having joined the Practical Class direct, by an open competition, in the previous year. He passed through the Staff College with great distinction in 1860, and in 1865 went to Canada. Whilst on service in that country he drew up a report on the defence of the frontier against American invasion, which especially attracted

the attention of the Commander-in-Chief, who noted its author for special employment. In 1867 he was appointed Deputy Assistant Quartermaster-General at Aldershot, and in 1871 he was transferred to what was then known as the Topographical Department (now the Intelligence branch). Whilst in that position, he worked out all the details of the scheme for the mobilization of the army. In 1873 he accompanied Sir Garnet Wolseley, as his Commanding Royal Engineer, in the Ashanti campaign, for which he received the brevet of Lieutenant-Colonel, the war medal, and a C.B. On his return from the Gold Coast, he resumed his duties at the Intelligence Department. In 1876 he was sent to Constantinople, to draw up a scheme for its defence. His reports were considered so able that he was rewarded with the brevet of Colonel. The work he did in this quarter proved what a grasp he had of all the details of the much-vexed Eastern Question, and he became in consequence the trusted adviser of the highest authorities on this subject. He served as Chief Commissioner for the delimitation of the Roumanian Boundary. His health, which had been undermined by his campaign on the Gold Coast, now broke down, and he succumbed to an attack of typhoid fever, in the beginning of 1879. Colonel Home was the author of "A Precis of Modern Tactics," which is universally considered the best tactical work in the English language. Short as his career was, he had shown himself to be a man of extraordinary ability, and impressed all those with whom he was brought in contact with a sense of his marvellous powers of organization, as well as grasp of detail. The "Times" said of him:—

"It can very rarely happen that a man should have been so little before the nation, and should yet have performed for it such signal services as Colonel Home. He was but forty-one years old, yet his reputation was solidly established among those who would certainly hereafter have entrusted him with more extended responsibility, and his name would probably then have become a household word among thousands who have now never heard of it." . . . "For few men would those who knew him have predicted a more brilliant career, and many better known men could have been better spared by both State and Army. The very energy with which he devoted himself to public work has deprived the nation of one of its most valuable servants."

The "Pall Mall Gazette" wrote of him:—

"A man died early on Thursday morning, of whom it may truly be said that, though his services and his name were barely known to the public at all, yet during the last few years those services have been of almost the first rank in political or military life."

Major WILLIAM HENRY PIERSON

joined the Bengal Engineers in December, 1858. He had been presented with a Cadetship at Addiscombe, by Captain Eastwick, an East India Director, who was a complete stranger to him, as a reward for having gained the gold medal of the British Association in that year, at the unprecedentedly early age of seventeen. He obtained his commission at the end of his third term, having won the Pollock medal and numerous prizes. Sir F. Abbott recorded that "Mr. Pierson is the most talented scholar I have seen at Addiscombe."

At the Chatham School of Military Engineering, he displayed so much professional ability, that when proceeding to India, he bore with him a special letter from the Director to the Indian Government. On arrival in India, he was almost immediately sent on active service with the Sikkim Field Force, when he carried out several difficult bridging operations with such success that he was three times mentioned in despatches, and received the special thanks of the Governor-General. Returning from Sikkim, he joined the Public Works Department in Oude, and from thence was selected to accompany Colonel Patrick Stewart to Persia, in 1863, to carry out the Indo-European Telegraph in that country, details of which will be found in Part III. Chapter VII.

Of his services in this difficult operation, Lieutenant-Colonel Bateman Champain recorded:—

"Pierson joined at Baghdad in the winter of 1863, and I posted him to the charge of 220 miles of line from Baghdad to Kangawar. From that time to the completion of the line his work was of the most arduous possible nature, innumerable obstacles being put in his way, and many vexatious political difficulties having to be overcome. We owed our eventual success chiefly to Pierson's indefatigable exertions, and to his personal influence with the Persian authorities and with the Khurdish chiefs of the neighbourhood."

Some idea of the work that fell upon Telegraph Officers in Persia may be gained by the fact of his having had to ride on three occasions from Kermanshah to Teheran, over 300 miles, within four days.

In 1866 he was sent on Telegraph duty to the Caucasus, and on his return march was attacked by twenty disbanded Persian soldiers, who killed his only attendant. Pierson successfully defended himself, saving his baggage, and carrying off the body of

his servant on his horse. He returned to England on a short leave in 1869, when he was employed as Secretary to the British representative at the International Telegraph Conference at Vienna. He then returned to Persia, where he erected the new palace of the British Legation at Teheran. He afterwards acted as Director of the Persian Telegraphs from 1871 to 1873.

After a second visit to England he was appointed to the Indian Defence Committee in 1877, when he drew up projects for the defence of Aden, Bombay, Kurrachi, and Rangoon. In 1880 he became Military Secretary to the Viceroy, and in that capacity so thoroughly mastered his work that he received the special thanks of the Governor-General. In March, 1881, he was appointed Commanding Royal Engineer to the Mahzud Waziri Expedition, in the course of which he fell a victim to the terrible heat of the Punjab frontier. He thus, at the early age of 41, closed a life of the very greatest promise and utility.

Pierson was a man of the most varied ability. In addition to being a distinguished practical and scientific soldier, an accomplished engineer and architect, and a profound mathematician, he was a first-rate linguist, an excellent musician, and an admirable artist. He was also in the first rank as an athlete. At Chatham he distinguished himself as a boating man, and in India was well known as a leading pig-sticker, many a first spear having been placed to his credit. It was not without good cause that he earned the title of the Admirable Crichton, which was universally accorded to him.

The authorities of Cheltenham College, at which he had been educated prior to his joining at Addiscombe, marked their sense of his loss by the erection of a tablet to his memory, with a medallion portrait, and the following inscription:—

"In Memory of William Henry Pierson, R.E., who died at Bunnoo, on the 2nd June, 1881, aged 41 years, whilst Commanding Royal Engineer, Wuzzeree Field Force. His brilliant career at Addiscombe reflected honour on This College. Gifted with varied and splendid talents, successful in works of great national importance, he was most distinguished by soldierlike, self-denying devotion to his Duty.

"Erected by order of the Council, in acknowledgment of the high example given by William Henry Pierson to the pupils of Cheltenham College."

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